DAWSON

CONSTRUCTION PLANT LIMITED

HPH 2400 HYDRAULIC

HAMMER AND POWER PACK

- USER'S MANUAL

HAMMER SERIAL NO: .....
HAMMER COMMISSION DATE: .....
POWER PACK SERIAL NO: .....
POWER PACK COMMISSION DATE: .....
ENGINE TYPE: .....
ENGINE SERIAL NO: .....
POWER PACK TYPE: .....

V6 23/05/07

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DAWSON

The responsible person:-

DAWSON CONSTRUCTION PLANT LIMITED
CHESNEY WOLD, BLEAK HALL
MILTON KEYNES MK6 1NE
ENGLAND

EC DECLARATION OF CONFORMITY

Description: _____

Type: _____

Serial Number: _____

The above mentioned equipment conforms to the Machinery Directive 89/392/EEC(a) as amended by Council Directive 91/368/EEC(b), Council Directive 93/44/EEC(c) and Article 6 of Council Directive 93/68/EEC(d).

Signed for and on behalf of
Dawson Construction Plant Limited: .....

Name: .....

Position: .....

Date: ...../...../.....

1.0 INTRODUCTION

The D.C.P. Hydraulic Hammer has been designed and manufactured to meet the demands of today's contractor. The hammer has many advantages over traditional piling hammers, including other hydraulic hammers:-

- The hammer fits all British and most foreign single sheet piles as well as numerous 'H' piles using one set of legs and inserts. It will also fit pairs of sheet piles and open bent corners with the same configuration. This significantly improves productivity and reduces costs.

- The hammer does not have a single electrical component on it. This means no vulnerable electrical cable running across the site and no delicate electronics on the hammer. All competent fitters can understand this hammer.

- Hydraulic hammers are inherently efficient, typically 80-90% of the potential driving energy being transferred into the pile as opposed to 25-35% for diesel hammers.

- Rapid blow rate. The hammer is double acting, not only giving high energy output, but increasing the speed of operation. This inevitably increases production and keeps the pile on the move.

- Infinitely variable stroke controlled, between limits, at the touch of a button. This enables precise energy control which is very important when commencing piling or when coping with delicate operations.

- Robust construction. The hammer has been designed with full knowledge of what is required of piling equipment. A quick look at the hammer sitting on a pile will confirm this.

- With the hammer weighing only 6 tonnes, it lends itself to being used on long reach jobs where there are few economic alternatives.

- Noise levels are considerably lower than that of diesel or air hammers.

- Transmitted ground vibrations have been measured lower than that of a vibrator.

1.1 Basic Safety Points

- Ear protection should be worn when in close proximity of the hammer.

- Keep clear of the hammer and/or power pack when they are being lifted.

- Avoid standing directly below the hammer when it is piling.

- Adhere to maintenance requirements set out in this manual.

- Lift equipment using lifting points specified only (see figures over).

1.2 Transportation and laying down hammer

- BEFORE operating hammer first time AND after each lay-down use inspection holes to ensure dolly is seated correctly in anvil before striking.

- WHEN LAYING DOWN HAMMER, support top of hammer at higher level than bottom of hammer.

- TRANSPORTATION, support top of hammer at higher level than bottom of hammer.

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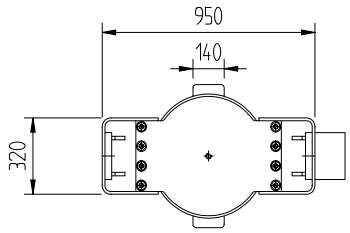
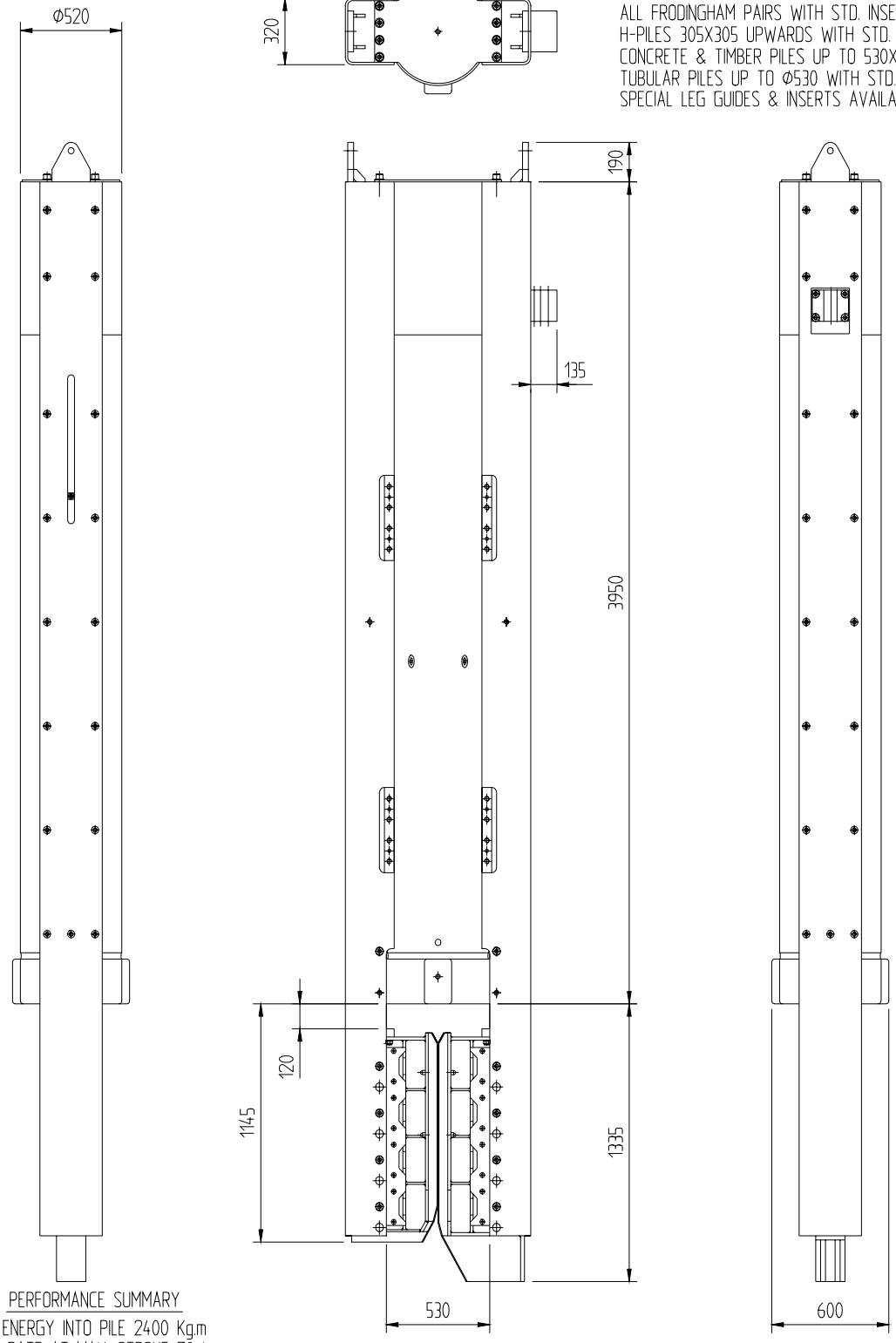


PILE CONFIGURATIONS

LARSSEN W's AND 6 IN SINGLES/PAIRS WITH STD. INSERTS
ALL FRODINGHAM PAIRS WITH STD. INSERTS
H-PILES 305X305 UPWARDS WITH STD. INSERTS
CONCRETE & TIMBER PILES UP TO 530X530 WITH STD. LEGS
TUBULAR PILES UP TO Ø530 WITH STD. LEGS
SPECIAL LEG GUIDES & INSERTS AVAILABLE ON REQUEST



PERFORMANCE SUMMARY

MAX. ENERGY INTO PILE 2400 Kg.m
BLOW RATE AT MAX. STROKE 70 b.p.m.
BLOW RATE AT MIN. STROKE 130 b.p.m.
TOTAL WEIGHT 6000 Kg
WEIGHT OF RAM 1900 Kg
OPERATING HYDRAULIC PRESSURE 240 bar
HYDRAULIC FLOW RATE REQUIREMENT 150 l/min
DIESEL ENGINE POWER 80 KW

Ref.no.	Qnt.	Part name	Material	Dimension	Remark
Design by M.LEE	Drawn at	Copied	Checked	Standard A3S / Affirmed / Scale 1 : 20	Replace / Replaced by
DAWSON CONSTRUCTION PLANT LTD.		BASIC SPECIFICATION OF HPH2400			File name / Date 4-1-93
					Drawing no. 2tspec

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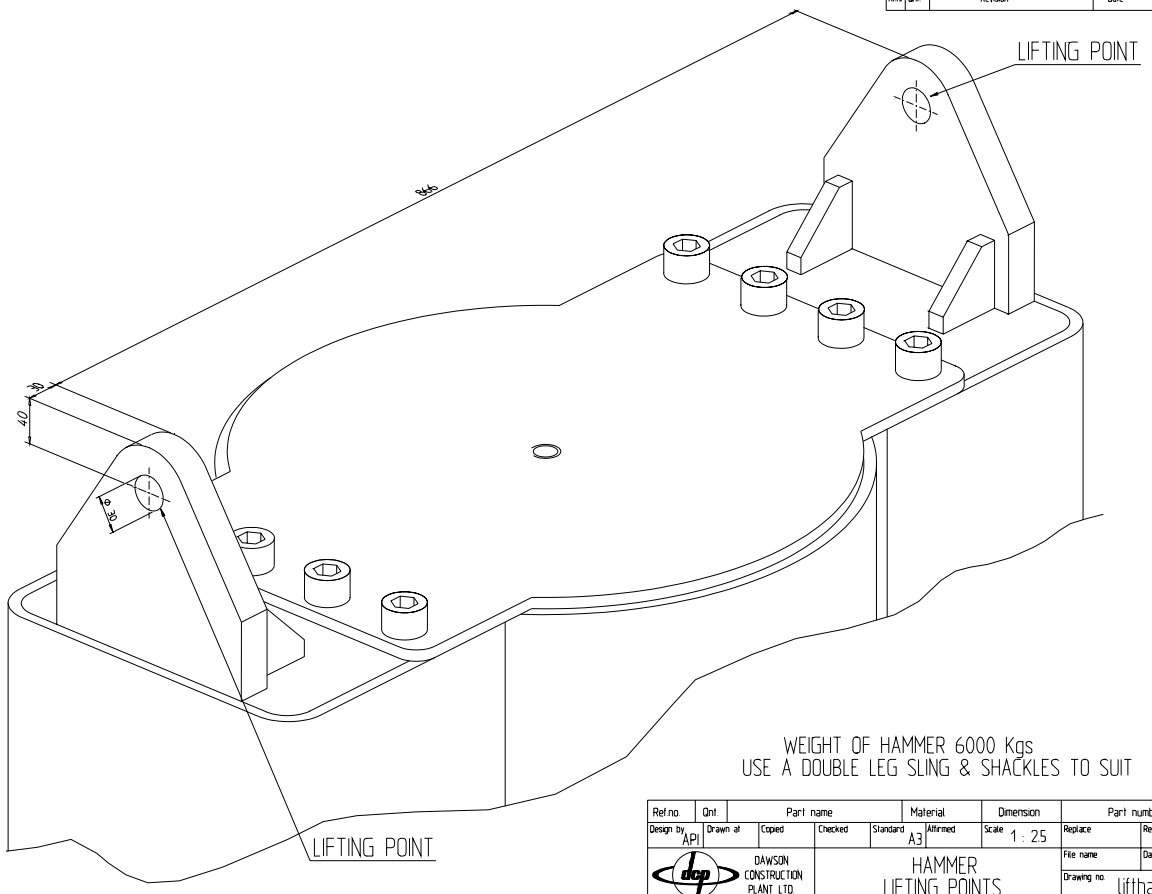
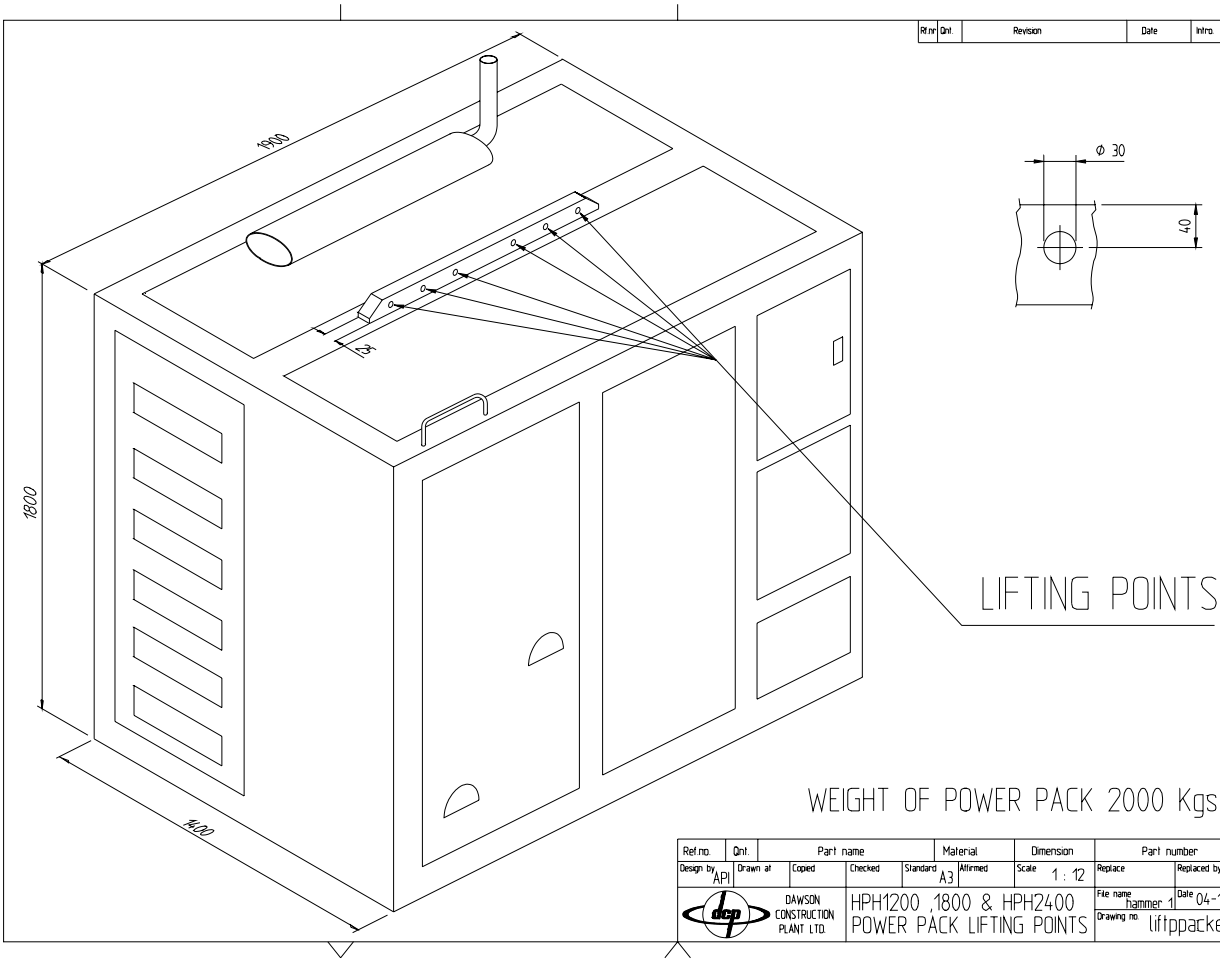


WEIGHT OF HAMMER 6000 Kgs
USE A DOUBLE LEG SLING & SHACKLES TO SUIT

Ref.no.	Qnt	Part name	Material	Dimension	Part number
Design by API	Drawn at	Copied	Checked	Standard A3 Affirmed	Scale 1 : 25	Replace	Replaced by
DAWSON CONSTRUCTION PLANT LTD.	HAMMER LIFTING POINTS	File name	Date 20-03-95
		Drawing no. lifthammer	

Rf.nr	Qnt.	Revision	Date	Intro.	Appr.by



WEIGHT OF POWER PACK 2000 Kgs

Ref.no.	Qnt.	Part name	Material	Dimension	Part number
Design by API	Drawn at	Copied	Checked	Standard A3 Affirmed	Scale 1 : 12	Replace	Replaced by
DAWSON CONSTRUCTION PLANT LTD.	HPH1200 ,1800 & HPH2400 POWER PACK LIFTING POINTS	File name hammer 1	Date 04-10-95
		Drawing no. liftppackeco	

2.0 HOW DOES THE HAMMER WORK? (See fig. 1)

The D.C.P. Hydraulic Hammer consists of a 'drop weight' driven up and down by a 'hydraulic ram' inside a 'casing.' The hydraulic ram is double acting which means the drop weight is accelerated both on the upstroke and on the downstroke. This gives the hammer its very efficient energy output and high blow rate.

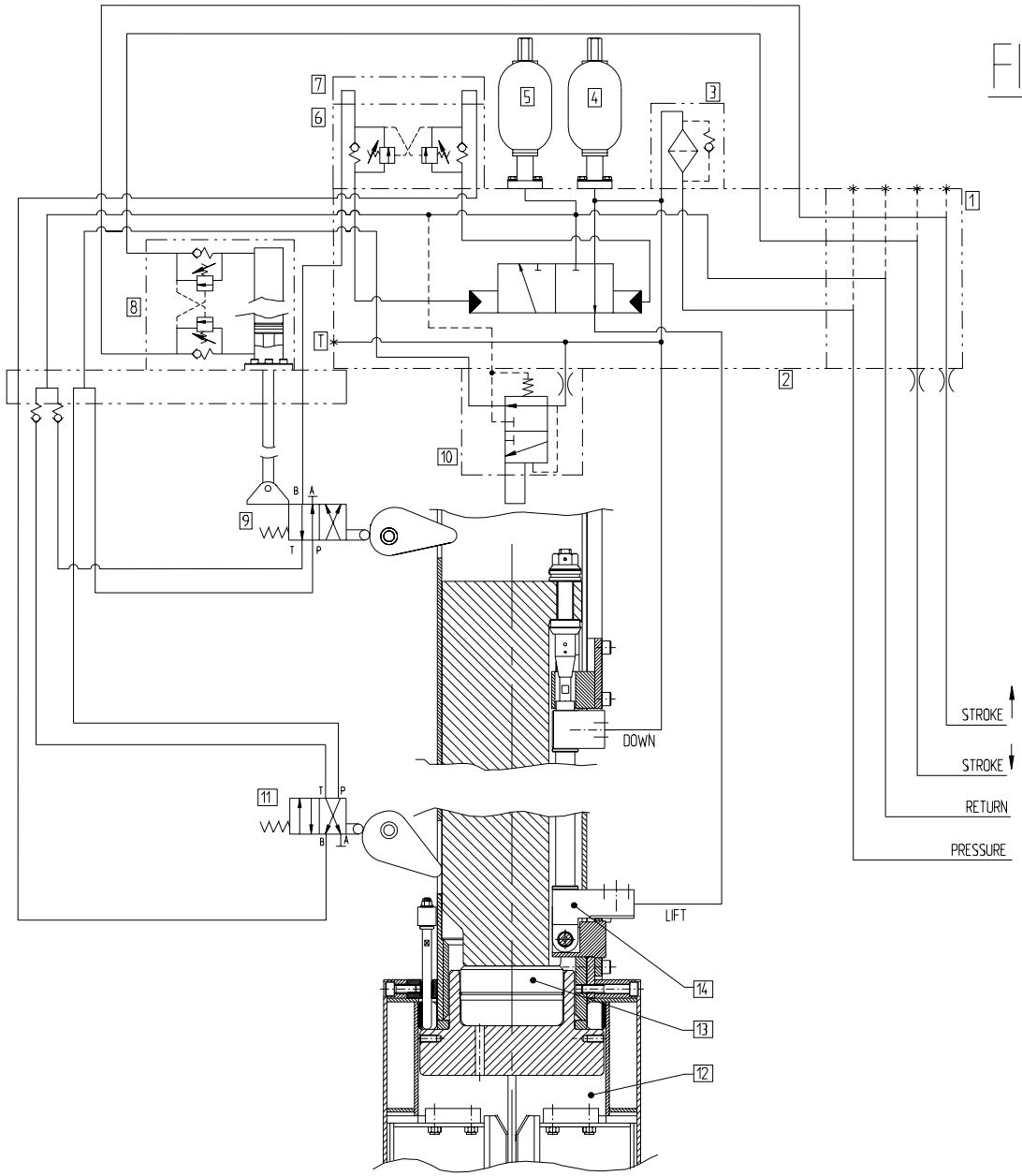
The oil supplied to the hydraulic ram comes from the power pack via a 'control valve' mounted inside the top of the hammer. This control valve switches the oil supply on or off at the upstroke side of the hydraulic ram i.e. oil supply 'on' lifts the drop weight and oil supply 'off' drops it.

The control valve itself has to be switched from one position to another at precisely the right times for optimum performance. The control valve is switched by hydraulic pilot signals from two mechanically actuated sensors mounted on the hammer casing. The 'bottom sensor,' when actuated by the drop weight, switches the control valve to the on (lift) position and the 'top sensor' switches the control valve to the off (drop) position. The stroke of the drop weight is adjusted by moving the position of the top sensor e.g. moving the sensor down reduces the stroke or vice versa.

The position of the top sensor is altered by a small 'height adjusting ram' mounted inside the top of the hammer. This is adjusted as required by the operator who can view an indicator on the side of the hammer.

The hammer is fully controlled using a hand-held control pendant. This unit enables the hammer to be started/stopped, run on single/automatic blows and have its stroke varied. The controller may be used from a remote position.

FIGURE 1



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T OVERTRAVEL VALVE BYPASS TEST LINE

Ref.no.	Qnt.	Part name	Material	Dimension	Part number
14		HYDRAULIC MAIN RAM			
13		DROP WEIGHT			
12		ANVIL			
11		BOTTOM SENSOR			
10		OVERTRAVEL VALVE			
9		TOP SENSOR			
8		HEIGHT ADJUSTING RAM			
7		CROSS OVER PLATE			
6		LOAD HOLDING VALVE			
5		LOW PRESS' ACCUMULATOR			
4		HIGH PRESS' ACCUMULATOR			
3		FILTER			
2		CONTROL VALVE			
1		INLET MANIFOLD			

Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
				A3				

DAWSON CONSTRUCTION PLANT LTD.

HYDRAULIC SCHEMATIC DIAGRAM OF HPH 1200 HYDRAULIC HAMMER

File name: hammer 1 | Date: 17-11-94

Drawing no: hydcircstd

3.0 POWER PACK AND HAMMER OPERATION

3.1 Connecting the hydraulic hoses and control pendant

(The power pack must be turned off at this time to enable correct installation of the hoses)

There are four hydraulic hoses running between the power pack and the hammer, viz:

1. Pressure line (1¼" BSP) carries the main high pressure oil supply to the hammer.

2. Return line (1½" BSP) returns low pressure oil from the hammer to the power pack.

3.} Height adjusting lines (3/8" BSP) used to deliver
4.} Oil to the height adjusting ram, as required.

The pressure/return hoses have the same specification. However, the return hose ends have larger fittings than the pressure hose to avoid possible confusion. Similarly, the height adjusting hoses have different end types. The hoses should be left connected to the hammer at all times - this reduces the likelihood of oil contamination and reduces leakage problems. The hoses should be connected/ disconnected at the outlets of the power pack. All these connectors are of the 'quick-release' type. The hoses should be disconnected from the power pack when moving the power pack around to avoid straining the connectors.

Make sure that the connectors are thoroughly cleaned when making a connection

Having connected the hoses, next fit the hand control pendant connector block to the multi-pin outlet from the power pack. This is positioned below the instrumentation panel of the unit. Check that a clean connection is made and that no water is present in either half of the connection. The 'power' switch on the controller should be turned off.

3.2 Checking the power pack before starting

Having connected the hydraulic hoses and hand control pendant, as described in section 3.1, next check fluid levels on the power pack. Check:

a. engine oil level
b. diesel fuel level
c. hydraulic oil level, and fill if required

Notes:-

1. The diesel fuel and hydraulic oil tanks have sight gauges on the side of the tanks.

2. The power pack will not run if the hydraulic oil level is too low.

3. The hammer will not run if the hydraulic oil temperature is too low. The auto warm-up routine must be used to pre-warm the oil. See section 3.3.1.

3.3 Starting the power pack (see fig. 2)

Prior to starting the power pack, check that the hand control pendant is turned 'off.' Set the throttle control lever to half of full throttle (2). Turn 'on' the battery isolator (1). Push the engine start push button (4) until the engine starts.

Allow the engine to reach working temperature by running it at 1500 r.p.m. under zero load for 10-15 minutes. Check all gauges and diagnostic lights for correct function of unit (diagnostic lights should be off.)

Notes:-

1. If any of the following L.E.D.'s (7, 8, 9 and 10) are 'on' when the isolator switch (1) is turned 'on,' the power pack will not start. Rectify problem immediately.

2. If L.E.D. (11) is on, the power pack will start but the pendant will be 'dead' until the hydraulic oil warm up procedure is carried out.

3.3.1 Hydraulic Oil Warm-up Procedure

If the hydraulic oil temperature is less than +25ºC, L.E.D. (11) will be on and the oil will require warming prior to using the hammer.

The hand control pendant will be 'dead' for as long as L.E.D. (11) is on.

To warm the oil:-

a) Run the engine at 1800 r.p.m.

b) Turn the 'warm-up/run' selector switch (5) to 'warm-up'. (The engine should go under load and the high pressure gauge (13) should read approx. 200 bar).

c) Leave the pack in this condition until the L.E.D. (11) goes off. (The engine should come off load at the same time the L.E.D. goes out and gauge (13) return to zero bar).

d) Turn the 'warm-up/run' selector switch (5) to 'run'. The power pack is now ready for use.

3.4 Using the hammer

3.4.1 Installing hammer on the pile

The hammer must be sat correctly on the pile to avoid hammer or pile damage. The pile tops should be as level and square cut as possible. The hammer anvil must be in good condition.

Lift the hammer onto the pile(s) to be driven. Lower the hammer down until the handling slings lose their tension. At this point, the anvil should be seated correctly i.e. the rubber ring around the anvil should be compressed between the casing and the anvil. If it is not and there is a gap here, re-site the hammer.

Note: Before using the hammer (and particularly after transportation) check that the dolly is fitted correctly in the anvil. There are inspection holes at the bottom of the hammer casing to check this.

3.4.2. Bleeding air from the hammer hydraulic system - only required when running hammer after initial connection or following a repair

When running the hammer for the first time after initial connection to the power pack, there will be air in the hydraulic system. The hammer will 'bleed' this air automatically but the following procedure must be applied:-

a. Run the power pack at 2200 r.p.m.

b. Turn on the control pendant 'power' button.

c. Adjust the stroke height indicator to minimum using the '↓' push button.

d. Set the 'Auto/Man' turn button to 'Man.'

e. Hold the 'start' push button down for 2-3 seconds.

f. Repeat (e) three or four times until the hammer consistently gives one or two small blows each time. Providing the hammer does not 'jump' on the pile, hold the 'start' push button down, so that the hammer gives several consistent blows, on the next operation. (Approximately 120 blows per minute.) If the hammer 'jumps' on the pile, because the drop weight is hitting the top of the hammer casing, the hammer will stop automatically. To reset see section 3.4.4.

g. Commence the piling operation using the hammer as required.

3.4.3 Pile driving with the hammer

Having the hammer sited on the pile and removed air from the hydraulic system (if necessary) as described above, the hammer is ready for pile driving:-

a. Increase the power pack engine speed to 2200 r.p.m. (having followed - "Starting the power pack" section 3.3)

b. Turn the hand control pendant 'power' button on.

c. Adjust the 'stroke height indicator' on the side of the hammer to minimum stroke by pressing the '↓' push button.

d. Set the 'Auto/Man' selector button to the required position:

   'Auto' - hammer will continue running automatically when the 'start' push button is pressed once.

   'Man' - hammer will only run whilst the 'start' push button is held down.

e. Depress the 'start' push button as required by 'Auto/Man.'

f. During operation the hammer stroke may be altered using the '↑' or '↓' push buttons to adjust the stroke height indicator.

g. To stop the hammer whilst it is running on 'Auto,' turn the 'Auto/Man' selector to 'Man' or turn the 'power' selector off.

It is good practice to start piling with the hammer set on minimum stroke, this limits unnecessary damage to both the hammer and the pile when the pile can be driven easily. The stroke may then be adjusted to suit the changing driving resistance.

On certain piling jobs, it may be possible to start driving on pairs of sheet piles, changing over onto a single sheet pile as the driving resistance increases (this will give maximum productivity.)

3.4.4 Cold running/overtravel

The hammer 'jumps' on the pile top when trying to achieve full stroke if the hydraulic system is 'cold.' If this happens, the hammer will **stop automatically.** (Thus preventing internal damage to the unit.) The power pack will continue to run and the 'pressure' gauge will read approximately 240 bar.

In order to reset the hammer, turn off the 'power' selector on the hand control pendant and stop the power pack. Allow the engine to stop for approximately 10 seconds then restart the unit. Reduce the stroke of the hammer to minimum. Run the hammer at this lower setting until the oil is warm enough to allow correct full stroke setting. If reducing the stroke does not cure the problem, warm the hydraulic oil as described in section 3.3.1.

If the hammer overtravels again, refer to the Troubleshooting section 6.0.

THE HAMMER WILL NOT RUN IF IT IS NOT ALLOWED TO RESET CORRECTLY

3.4.5 Refusal

Piling must stop with this hammer when the rate of driving reaches 10 blows per 25mm.

Continued use will result in hammer and/or pile damage

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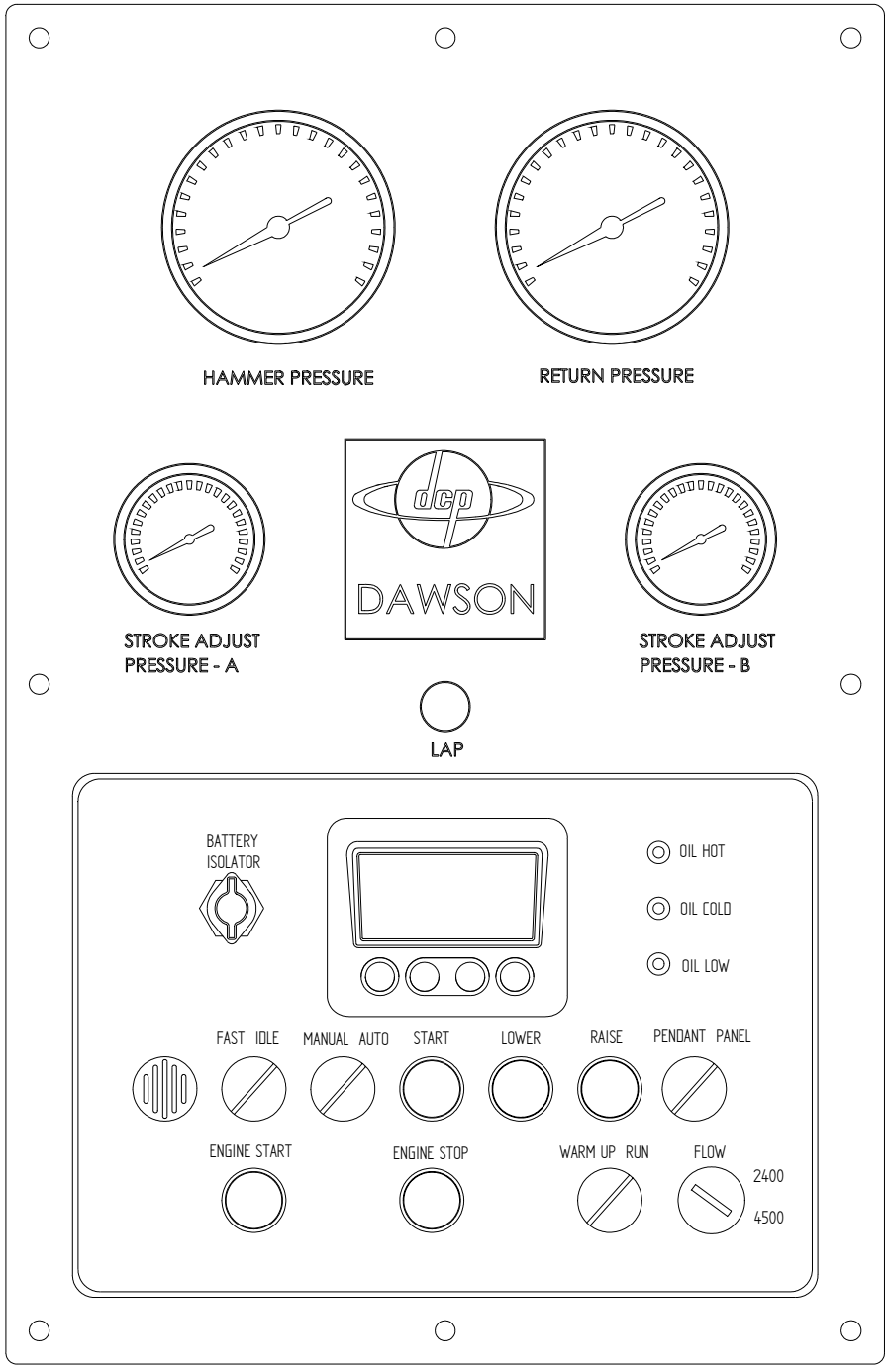
3RD ANGLE



NOTES:-

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RJC	RJC	-	-	A4	-	-	-	-

DAWSON CONSTRUCTION PLANT LTD.

POWER PACK INSTRUMENTATION PANEL FOR HPH 4500

File	Date
-	15/04/2005

Drawing no. 4500 SPEC.7

3.5 Using the hammer underwater

It is possible to drive piles with this hammer underwater. However, the hammer must be prepared correctly in order to do so - it can not be used underwater in standard format.

The work involved is briefly as follows:-

a) The stroke adjuster 'slot' in the leg guide must be sealed with a cover.

b) The insides of the hammer should be suitably greased to minimise the effects of corrosion.

c) The gaps between hammer casing, leg guides and top cover must be sealed with silicone mastic.

d) The inspection holes near the bottom of the hammer casing must be plugged.

e) A threaded compressed airline port must be added in the bottom end of the hammer casing or leg guide.

f) The hammer must be run in conjunction with a 35/70 c.f.m. (100 psi) air compressor.

g) The hammer grease nipples must be greased after every pile drive to ensure ample lubrication.

NOTE: FOR DETAILED ASSISTANCE WITH THIS TYPE OF WORK PLEASE CONTACT THE MANUFACTURER.

3.6 Wider or special pile sections.

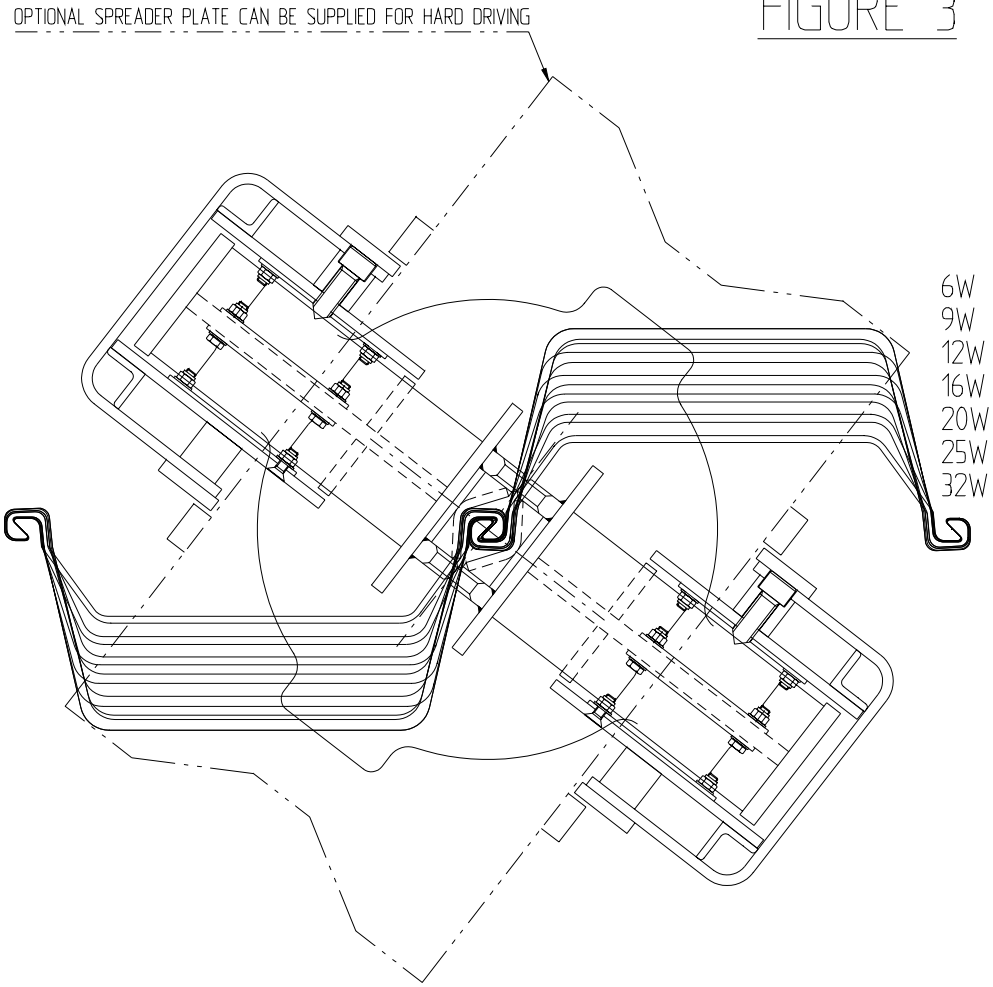
The HPH 2400 hammer in standard format will drive a considerable range of steel piles. In some applications, however, where sheet piles are particularly wide or perhaps boxed together it is possible to use simple leg insert modifications and/or spreader plates to give improved pile coverage reducing pile head stress and improving productivity rates.

The standard leg inserts can have "wing extensions" bolted on to correctly centralise the hammer on a single sheet pile. Then either a special anvil can be used to give wider coverage, or, by dropping the inserts to a lower set of location holes, a 'spreader plate' can be added below the standard anvil to give improved pile coverage. This is a tried and tested technique (see figure 3).

With tubular piles, for example, the standard inserts can be removed and in place some simple bolt on plates added to centralise the hammer on the tube (see figure 4). A further refinement, if necessary, is to weld a ring onto the underside of the anvil to give correct location on the tube.

PLEASE CONTACT THE MANUFACTURER IF YOU HAVE A SPECIFIC PILE DRIVING PROBLEM - IT MAY HAVE BEEN DONE BEFORE!

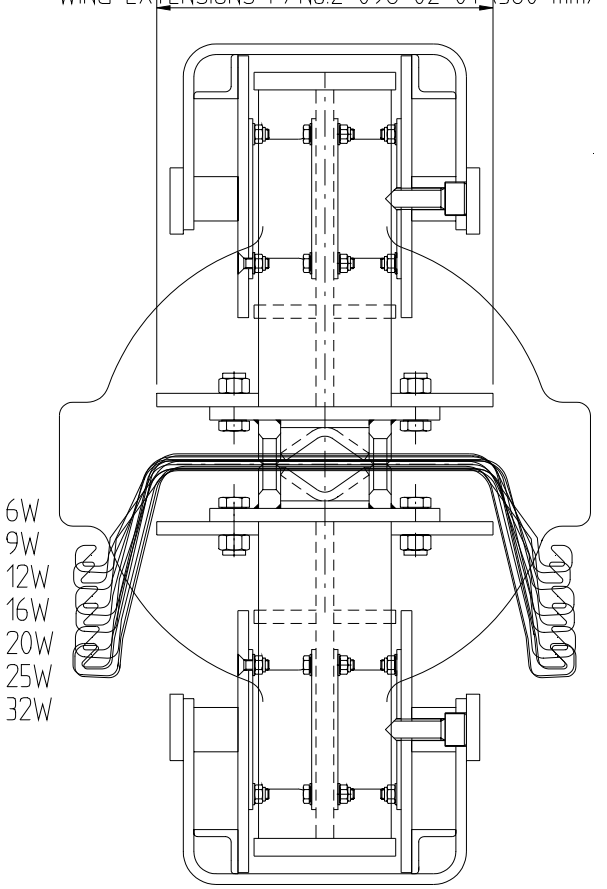
FIGURE 3



DRIVING LARSSEN W's IN PAIRS

HAMMER CAN BE READILY USED IN STANDARD FORMAT
IMPROVED PILE COVERAGE CAN BE ACHIEVED AS SHOWN

WING EXTENSIONS P/No.2-096-02-01 (380 mm)



DRIVING LARSSEN W's IN SINGLES

HAMMER CAN BE READILY USED IN STANDARD FORMAT
BUT WING EXTENSIONS WILL CENTRALISE HAMMER AS SHOWN

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Ref.no.	Qnt.	Part name	Material	Dimension	Remark

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M.LEE				A3		1 : 5		

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HPH2400 HAMMER ON B.S.C. LARSSEN 'W' SHEET PILE SECTIONS

File name | Date 29-3-95

Drawing no. 2tintlw

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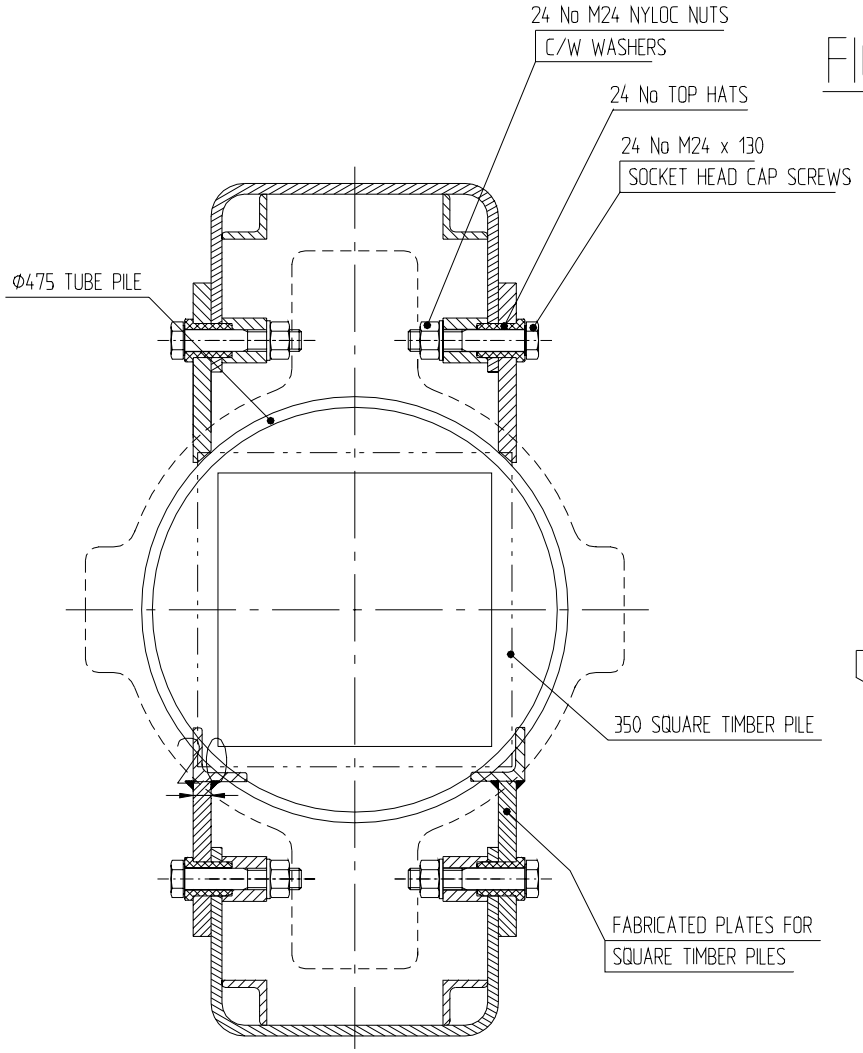
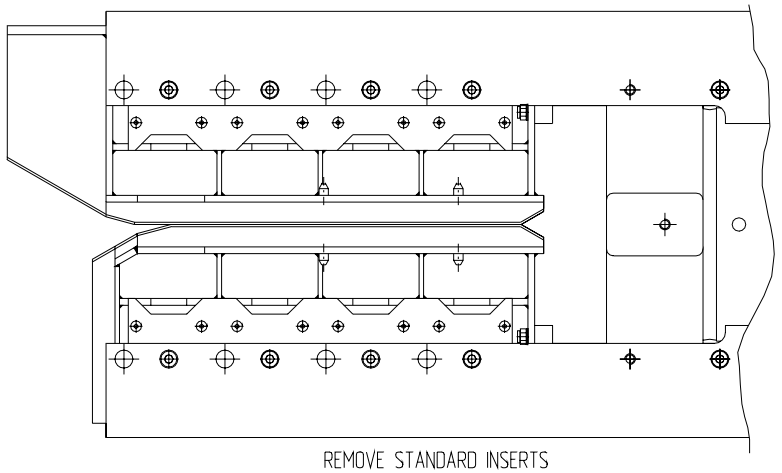
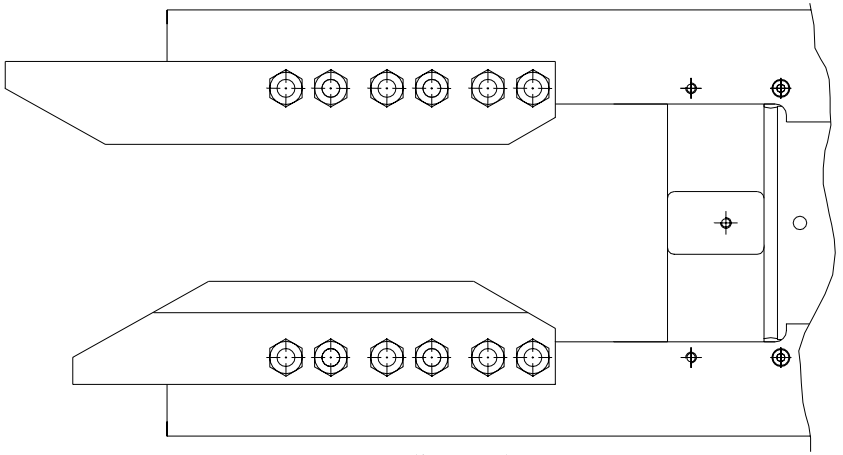
FIGURE 4



STANDARD HAMMER



REMOVE STANDARD INSERTS



AND FIT PLATES

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Design by: API	Drawn at	Copied	Checked	Standard: A3	Affirmed	Scale	Replace	Replaced by
DAWSON CONSTRUCTION PLANT LTD.	HPH 2400 INSERT ARRANGEMENT ON CIRCULAR/SQUARE TIMBER PILES & TUBES.	File name	Date: 31-3-95
		Drawing no.: 2tinttube	

3.7 PREVENTATIVE MAINTENANCE GUIDELINES FOR HPH 1200 & 2400 HYDRAULIC HAMMERS, AND DIESEL ENGINED POWER PACKS

	DAILY OR REFUELLING	EVERY 125 HOURS	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 2000 HOURS
ENGINE	CHECK: • OIL LEVEL • COOLANT LEVEL • FAN - INSPECTION • DRIVE BELT - INSPECT • FUEL WATER TRAP - DRAIN		CHANGE: • LUBE OIL • LUBE FILTER CHECK: • AIR CLEANER • INTAKE SYSTEM • CHARGE AIR COOLER	CHANGE: • FUEL FILTER CHECK: • ANTI FREEZE	ADJUST: • VALVE LASH CLEARANCE CHECK: • FAN HUB • BELT TENSIONER BEARING • BELT TENSION	CHANGE: • ANTI FREEZE CHECK: • DAMPER
POWER PACK	CHECK: • HYDRAULIC OIL LEVEL • AIR INLET/OUTLETS FREE FROM OBSTRUCTION • CONDITION OF LIFTING POINTS & SLINGS/SHACKLES • TEST DIAGNOSTIC LEDS • INSPECT GAUGES • CONDITION OF QUICK RELEASE COUPLINGS	CHECK: • FOR HYDRAULIC OIL LEAKS & RECTIFY • CONDITION OF HOSES • TIGHTNESS OF FASTENERS • CONDITION OF PAINTWORK • BATTERY WATER LEVEL • FUNCTION OF PENDANT & CONDITION OF CABLE	CHECK: • BATTERY CHARGING CHANGE: • HYDRAULIC OIL/FUEL FILLER FILTERS	CHECK: • PRESSURE OUTPUT OF PUMP • FLOW OUTPUT OF PUMP CHANGE: • PRESSURE/RETURN HYDRAULIC FILTERS	CHECK: • CONDITION OF WIRING • DRIVE COUPLING FOR WEAR • CONDITION OF EXHAUST CHANGE: • HYDRAULIC OIL AND CLEAN OUT SYSTEM	
HAMMER	CHECK • ALL EXTERNAL FASTENERS FOR TIGHTNESS • DOLLY CONDITION • SUSPENSION BLOCK & SUSPENSION RING CONDITION • LIFTING POINT CONDITION • SERVICEABILITY OF SLINGS/SHACKLES **MUST:** • GREASE HAMMER FREQUENTLY	CHECK: • TIGHTNESS OF ALL HOSES, FITTINGS AND FASTENERS INSIDE HAMMER • CONDITION OF BOTH SENSORS • WEAR LEVEL ON LEG INSERTS	CHECK: • ACCUMULATOR NITROGEN PRECHARGE PRESSURES • HAMMER FILTER • FUNCTION OF OVERTRAVEL VALVE • FUNCTION/CONDITION OF PROBE ASSEMBLY AND BOTTOM TRIP DEVICE CHANGE: • RESILIENT WASHERS BETWEEN DROP WEIGHT & HYDRAULIC RAM ON HPH 2400 ONLY	CHECK: • CONDITION OF HEIGHT ADJUSTING RAM • TIGHTNESS OF ACCUMULATORS • CONDITION OF MAIN FEED HOSES TO HAMMER CHANGE: • RESILIENT WASHERS BETWEEN DROP WEIGHT AND HYDRAULIC RAM	CHECK: • PLAY IN MAIN RAM ANCHORAGE ASSEMBLY • CONDITION OF ANVIL • PLAY BETWEEN DROP WEIGHT AND CASING BORE	
	-	TEST RUN ON PILE 15 MINUTES BEFORE AND AFTER CHECKING	TEST RUN ON PILE 15 MINUTES BEFORE AND AFTER CHECKING	TEST RUN ON PILE 30 INUTES BEFORE AND AFTER CHECKING	TEST RUN ON PILE 30 MINUTES BEFORE AND AFTER CHECKING	TEST RUN ON PILE 30 MINUTES BEFORE AND AFTER CHECKING

(FOR FULL DETAILS SEE SECTIONS 4 AND 5 IN THE HAMMER MANUAL AND THE CUMMINS SERVICE MANUAL)

4.0 HAMMER MAINTENANCE (SEE APPENDIX 7.1)

4.1 Daily maintenance checks (or every 10 hours)

a. Apply Lithium based general purpose grease to hammer through each one of five grease points (part 1-057-00-01). Twenty operations of a grease gun on each grease point every shift will be adequate.

b. Check all external fasteners for tightness and re-tighten where necessary.

c. Check that the dolly (part 2-006-00-06) has not been damaged or worn beyond its serviceable limit. If the dolly is replaced, ensure that the O' ring is replaced with it (part 2-067-00-01).

   To inspect the dolly, remove sixteen screws (part 2-034-00-01) and drop the leg inserts (2-019-00-01 and 2-020-00-01) down far enough to view the dolly. If the dolly is compressed past it's serviceable limit or if the dolly is cracked in many places replace it. Please refer to figure 4.1 for guidance on acceptable dolly wear.

   To replace the dolly insert a steel bar through one of the holes in the bottom of the anvil (part 2-005-00-01) and drive the old dolly out using a hammer. Insert a new dolly (complete with O' ring) ensuring that it is pushed fully home.

d. Check the suspension blocks (part 2-025-00-01) and suspension ring (part 2-024-00-5) for wear/damage and replace if necessary. These must be in good condition at all times. These items act as the hammers 'suspension system' reducing the shock transmitted from the blow to the hammer and its components - **very important** for keeping the hammer functioning correctly.

e. Check the condition of lifting tackle and lifting points prior to being taken into service.

4.2 Planned 125 hour maintenance checks (run the hammer for 15 minutes before and after this maintenance work)

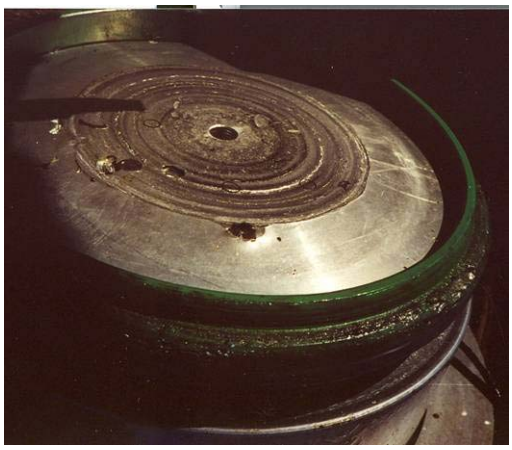
Every 125 hours the following work should be carried out in addition to that described in 4.1 above:-

a. Remove each hammer leg guide in turn and check the condition and tightness of: all hydraulic hoses and fittings; bolts; locking rings, and visually check all components for condition.

b. Check the condition of each sensor assembly paying particular attention to cam wear, roller operated valve travel and tightness of fixing bolts. Each roller valve should have a travel of 4mm through full actuation of its associated cam. This measurement is critical and if it is not achieved the hammer will not run correctly (as with the ignition timing on a motor car). Travel can be lost through excessive cam wear or with wear on the roller or roller pin at the end of the valve.

c. Check the condition of leg inserts to ensure correct fitting on pile sections. The inner faces of each insert should touch the opposite insert. If not, the wear faces may require building up with hard facing.

Figure 4.1



Debris embedded in dolly, remove debris and continue.

Severely cracked 6500 dolly should be replaced.

Overworked 6500 dolly stuck in anvil body must be replaced or it can cause the anvil body to break.

If dolly is not replaced when it has been overworked, the anvil body can break due to expansion of dolly material.

4500 dolly starting to show signs of cracks after 150 hrs of piling. O.K. but if cracks extend to the outer edge or the underside of the dolly, it must be changed.

View showing underside of 4500 dolly after 150 hrs of work. No signs of cracking. O.K.

4.3 Planned 250 hour maintenance checks (run the hammer for 15 minutes before and after this maintenance work)

Every 250 hours the following work should be carried out in addition to the work described in 4.1 and 4.2 above:

4.3.1 Change the Disc Springs

The flexible coupling between the main hydraulic ram and the drop weight must be changed. The procedure is quite straightforward (see figure 5). Failure to do this will result in an expensive repair.

a. Lay the hammer on stable level ground on its Front Leg Guide packed on timbers. Remove the Rear Leg Guide (part 2-002-00-01).

b. Remove the 3 no. Nyloc Nuts, Dog Point Grub Screws and Anti-Vibration Washers (parts 6945, 2-088-00-01 and 2-089-00-01) from the Connector Nut (part 2-011-00-03). It may require a little heat to melt the Loctite on the grub screws.

c. Unscrew the Connector Nut from the Ram Connector (part 2-009-00-04) and remove the Nut together with the top stack of Disc Springs (2-022-00-01), Guide Bush (2-015-00-02) and Buffer Spacer (2-012-00-04).

d. Retract the piston rod of the Hydraulic Ram from the Drop Weight by hand and remove the other Disc Spring stack.

e. Inspect the removed steel components for wear and replace those with signs of fretting or bruising. Dispose of the old Disc Springs if there are any signs of radial cracking or unusual wear - do not reuse them if in doubt.

f. Ensure the Connector Nut threads are clean and fully degreased. Pay particular attention to de-greasing the Grub Screws threads and the Grub Screws as this will ensure the Loctite adhesive works correctly. **Failure to do this correctly may result in the assembly working loose!**

g. Re-assemble the connection as in figure 5 ensuring the new Disc Springs are installed in pairs using adequate EP Moly grease. Coat the Guide Bushes and Washers with EP Moly grease on all contact faces. Tighten the Connector Nut until it is hand tight, approximately 45 Nm (33ft.lbs). Tighten the Connector Nut further using a socket until the top Buffer Spacer is compressed by 2.5mm. Align a Dog Point Grub Screw hole in the Connector Nut with one of the axial slots in the Ram Connector thread. This may require the Nut to be tightened slightly further.

h. Install the 3 no. Dog Point Grub Screws using some Loctite 270 Studlock thread adhesive, and fully tighten each in turn to the torque quoted on Figure 5. Next install the pairs of anti-vibration washers onto each grub screw and lock the grub screws using new Nyloc nuts.

i. Re-assembly the Rear Leg Guide on the hammer. The unit is now ready for running.

4.3.2 Other items

a. Check the accumulator (part 1-048-00-04) precharge pressures using the gas pressure checking kit and a bottle of nitrogen gas.

   The precharge pressures are:-

   High pressure -100 bar (two accumulators)
   Low pressure - 3 bar (two accumulators)

   To gain access to the accumulators it is necessary to remove the top cover (part 2-017-00-01). The two high pressure accumulators are on the left hand side viewed from the inlet manifold. To check the precharge pressures see appendix 7.2 in this manual.

b. Check the hammer filter (part 2-079-00-01) for cleanliness. First remove the top cover (part 2-017-00-01). Then unscrew the filter bowl and remove the filter element. Check the filter for damage and any unusual debris. Wash the filter with clean diesel and blast through from inside the filter with compressed air. Alternatively throw the element away if it is a non-metallic filter.

   PAY EXTRA CARE NOT TO ALLOW DIRT INTO THE FILTER ASSEMBLY ON RE-FITTING

c. Check the function and condition of the bottom trip device.

d. Check the function of the hammer's overtravel valve by intentionally overstroking the hammer when cold.

4.4 Planned 500 hour maintenance checks (run the hammer for 30 minutes before and after this maintenance work)

Besides work mentioned in 4.1, 4.2 and 4.3 above the following work should be carried out:-

a. Condition and function of the Height Adjusting Ram.

b. Tightness of the Accumulator assemblies.

c. Condition of the main feed hoses between the hammer and power pack. Hoses with excessive amount of "braiding" exposed or damaged should be replaced.

4.5 Planned 1000 hour maintenance checks (run the hammer for 30 minutes before and after this maintenance work

Check the following:-

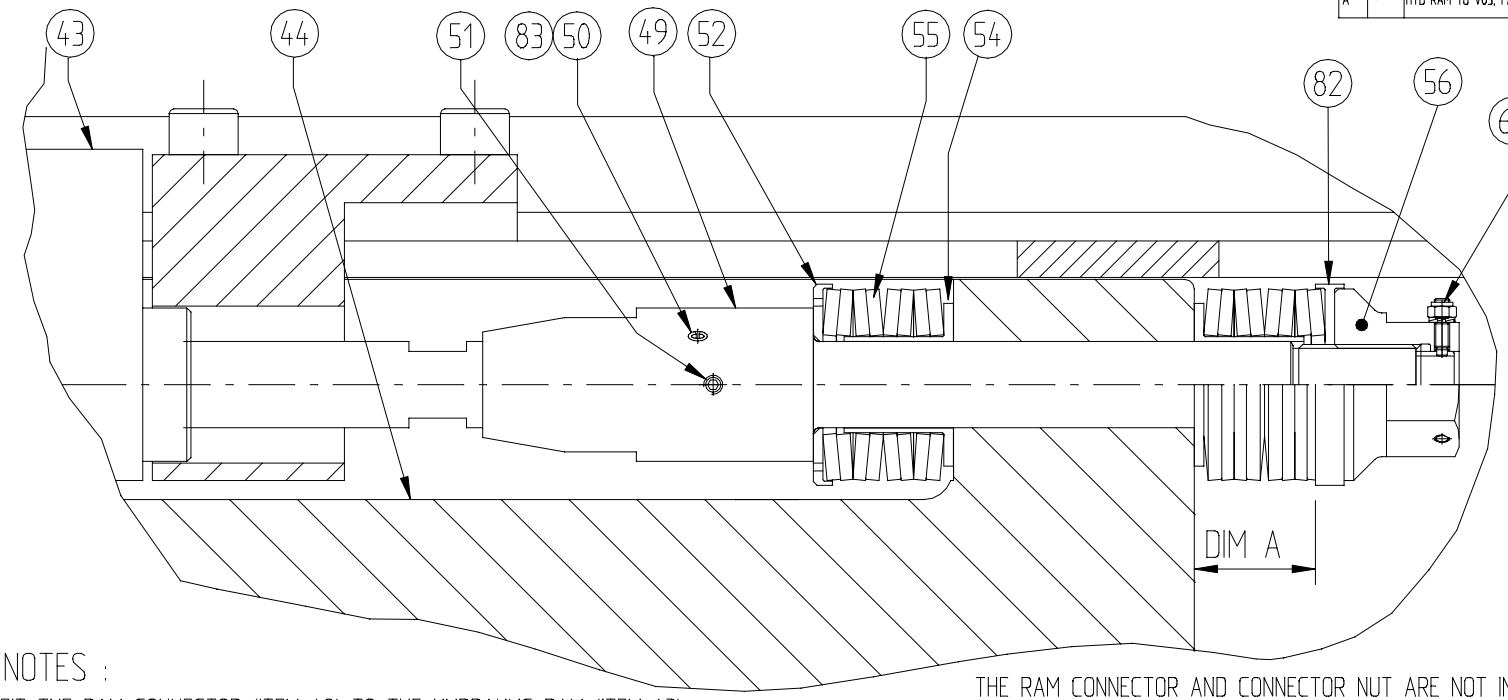
a. Play in the main ram anchorage assembly.

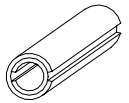
b. Condition of the Anvil.

c. Play between the Drop Weight and Casing bore.

   Note: It is strongly recommeded that in order to achieve thorough and correct maintenance of this equipment that customer's service personnel should be fully trained by the manufacturer.

Rf.nr	Qnt.	Revision	Date	Intro.	Appr.by
A	-	HYD RAM TO V03, FASTNERS TO OM+ DESCPN.	09/07/07	DAB	DAB





PICTORIAL VIEW
OF INSTALLED PINS
SHOWING SLOT ORIENTATION
OF 180° APART

NOTES :

FIT THE RAM CONNECTOR (ITEM 49) TO THE HYDRAULIC RAM (ITEM 43)
DRILL THROUGH THE RAM CONNECTOR Ø 10 AT 45° TO THE M10 HOLES
AT A DISTANCE OF 120 MILLIMETRES FROM THE TAPERED END OF THE RAM CONNECTOR
ENSURE THE SLOTS OF THE TWO PINS (ITEMS 50 & 83) ARE STAGGERED BY 180°

CLEAN THE M 10 HOLES OF THE RAM CONNECTOR AND THE TWO CONE POINT
SOCKET SET SCREWS (ITEM 51) WITH LOCTITE 7063 . ALLOW TO DRY FOR 2-3 MINUTES

APPLY LOCTITE ACTIVATOR 7471 TO THE AREAS PREVIOUSLY CLEANED AND
ALLOW TO DRY FOR 2-3 MINUTES.

APPLY LOCTITE STUDLOCK 270 TO THE M 10 HOLES IN THE RAM CONNECTOR
AND INSTALL THE CONE POINT SET SCREWS TIGHTENING TO A TORQUE OF 36 Nm
REMOVE ANY EXCESS LOCTITE

ASSEMBLE THE DISC SPRINGS & OTHER COMPONENTS AS SHOWN ENSURING THAT ALL
ITEMS ARE COATED WITH EP MOLY GREASE - PARTICULARLY THE DISC SPRINGS

DIM A (NUT FULLY TIGHTENED) = DIM A (NUT HAND TIGHT @ 45Nm/33 ft.lbs) - 2·5mm

CLEAN , ACTIVATE AND APPLY STUDLOCK AS PREVIOUSLY
WHEN ASSEMBLING ITEMS 70 , 70 AND 70
TORQUE TIGHTEN ITEM 70 TO 18 Nm ON ASSEMBLY
TORQUE TIGHTEN ITEM 68 TO 30 Nm ON ASSEMBLY

FIGURE 5

THE RAM CONNECTOR AND CONNECTOR NUT ARE NOT INTERCHANGEABLE
WITH EARLIER VERSIONS I.E. 2-009-00-03 AND 2-011-00-02
THE RAM CONNECTOR AND CONNECTOR NUT MUST BE INSTALLED AS A PAIR

Ref.no.	Qnt.	Part name	Material	Dimension	Part number
83	1	SPRING PIN	TYPE SS	Ø6X70	0M06-070-02
82	1	DISC SPRING BUFFER SPACER			2-012-00-04
70	3	DOG POINT SKT SET SCREW		M8 x 30	2-088-00-01
69	3	ANTI-VIBRATION WASHER PAIR	NORD-LOCK	M8	0M08-000-27
68	3	NYLOC NUT		M8	0M08-000-11
56	1	CONNECTOR NUT			2-011-00-03
55	16	DISC SPRING			2-022-00-01
54	2	DISC SPRING GUIDE BUSH			2-015-00-02
52	1	DISC SPRING BUFFER WASHER			2-010-00-05
51	2	CONE POINT SKT SET SCREW		M10x12	0M10-012-17
50	1	COMPOUND PIN TO DIN 1481	TYPE SS	Ø10x70	0M10-070-22
49	1	RAM CONNECTOR			2-009-00-04
44	1	DROP WEIGHT			2-001-00-01
43	1	HYDRAULIC RAM			2-008-00-03

Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
API				A3		1 : 4		

DAWSON CONSTRUCTION PLANT LTD.

HPH 2400 DROP WEIGHT
TO MAIN RAM CONNECTION

File name | Date 12-9-97

Drawing no. manfig5f

5.0 POWER PACK MAINTENANCE

5.1 Power pack specification

5.1.1 Basic specification

Engine power output	-	66 kW @ 2300 rpm
Engine maximum r.p.m.	-	2300
Hydraulic flow output	-	150 l/min
Max hydraulic pressure output	-	230 Bar
Dimensions (l x w x h)	-	1900 x 1400 x 1800mm
Weight	-	2000 kg

5.1.2 Lubrication specification

Hydraulic oil type	-	Fina Hydran LZ 32 or equivalent
Hydraulic oil capacity	-	465 litres
Diesel engine oil type	-	15 W 40
Diesel engine oil capacity	-	9.5 litres (incl. filter)
Diesel fuel type	-	DIN 51601-DK
Diesel fuel capacity	-	235 litres

5.2 Daily maintenance checks (for full details of diesel engine maintenance see Cummins service manual)

a. Check hydraulic oil level - must be visible in sight glass, but not over half way in sight.

b. Check diesel lubrication oil level.

c. Ensure pump isolator valve is fully open.

d. Ensure air inlet/outlet panels are free from obstruction.

e. Drain water from diesel water trap.

f. Inspect lifting tackle and lifting points before being put into service.

g. Check function of diagnostic L.E.D.'s by pressing test button.

h. Check function of gauges.

i. Check condition of quick release couplings.

j. Check engine coolant level.

k. Check condition of fan and drive belt.

5.3 Planned maintenance checks

For full details of diesel engine maintenance see Cummins service manual and for power pack maintenance procedures see section 5.4.

5.3.1 Every 125 hours

Check the following:-

a. Hoses, pipework and fittings for any hydraulic oil leaks and rectify as required.

b. Tightness of all fasteners.

c. Condition of body panels and paintwork. Touch-up where necessary.

d. Battery water level.

e. Condition and function of hand control pendant.

5.3.2 Every 250 hours

Check the following:-

a. Engine air cleaner.

b. Engine intake system

c. Engine charge air cooler.

d. Battery charging rate.

Change the following:-

e. Engine oil.

f. Engine oil filter.

g. Hydrauic oil filling filter.

h. Diesel fuel filling filter.

5.3.3 Every 500 hours

Check the following:-

a. Anti freeze in engine coolant.

b. Pump output flow rate and working pressure.

Change the following:-

c. Fuel filter.

d. Hydraulic oil pressure and return filters.

5.3.4 Every 1000 hours

Check the following:-

a. Engine fan hub.

b. Engine belt tensioner bearing.

c. Engine belt tension.

d. Adjust valve lash clearance on engine.

e. Condition of all wiring and tightness of electrical connectors.

f. Wear on hydraulic pump flexible coupling.

g. Condition of exhaust.

Change the following:-

h. System hydraulic fluid.

5.4 Maintenance procedures

NOTE: Before any of the following procedures are undertaken, the battery isolator switch must be switched off.

a. Changing fuel/hydraulic oil inlet filler elements.

(i) Replacement element
(ii) Remove filter bowl
(iii) Remove and discard filter element (do not clean)
(iv) Wash bowl thoroughly
(v) Fit replacement element into bowl
(vi) Re-assemble filter
(vii) Prime hand pump

b. Changing hydraulic pressure filter element.

(i) Replacement element
(ii) Remove filter bowl
(iii) Remove and discard filter element (do not clean)
(iv) Wash bowl thoroughly
(v) Fit replacement element onto spigot
(vi) Fill filter bowl with clean hydraulic oil
(vii) Replace bowl O' ring if necessary
(viii) Re-assemble filter

c. Change hydraulic return filter element.

(i) Replacement element
(ii) Remove filter bowl
(iii) Remove and discard filter element (do not clean)
(iv) Wash bowl thoroughly
(v) Fit replacement element onto spigot
(vi) Fill filter bowl with clean hydraulic oil
(vii) Replace bowl O' ring if necessary
(viii) Re-assemble filter

d. Pump removal/re-fitting.

(i) **IMPORTANT NOTE** - the hydraulic pump should be returned to the manufacturer for repair/overhaul. This item **must not** be stripped or tampered with.

(ii) Isolate pump from hydraulic oil reservoir using pump isolator valve
(iii) Remove hoses from pump body
(iv) Remove mounting screws from front flange of pump
(v) Withdraw pump from coupling towards oil reservoir
(vi) Remove bellhousing from engine mounting flange
(vii) Reverse procedure for re-assembly
(viii) Fill case drain of pump with clean hydraulic oil prior to start up following removal from the system (port located on the top of the pump with adaptor fitted)

e. Cooler removal/re-fitting.

(i) Close pump isolator valve to prevent system syphoning
(ii) Remove flexible hoses from cooler
(iii) Remove mounting bolts from cooler
(iv) To remove matrix, remove top and bottom retaining strips from front of cooler and withdraw matrix from front of cooler assembly

f. Control valve assembly.

(i) Close pump isolator valve to prevent system syphoning
(ii) To replace solenoid coils remove plastic retainer from end of coil and withdraw coil from retaining tube
(iii) To replace valve assemblies remove 4 off retaining screws from top of valve and replace component as necessary

g. Pipework.

(i) For details of hose assemblies see hydraulic schematic drawing Appendix 7.4.1
(ii) In the event of steel pipe failure, 25mm 3 series fittings should be utilised in conjunction with 25mm bore x 3mm wall thickness tube
(iii) Welded pipe ends are currently utilised and should it become necessary to disturb these fittings a replacement O' ring should be used

h. Changing system hydraulic fluid

(i) Change hydraulic fluid
(ii) Remove cleanout cover and clean reservoir
(iii) Replace fuel inlet and hydraulic fluid inlet filter elements
(iv) Replace hydraulic pressure line filter element
(v) Replace hydraulic return line filter element
(vi) Blow through cooler matrix to clear
(vii) Replace solid pipe fitting O' rings as necessary
(viii) Replace tank cover gasket
(ix) Check all electrical connections for tightness
(x) Check drive coupling for wear and replace or adjust if necessary

5.5 Setting procedures

a. Re-setting pressure

The pressure regulating adjuster is situated on the main control valve assembly.
To adjust:

(i) Loosen the lock nut and wind the centre spigot counter clockwise to reduce pressure
(ii) Press the test button on the control panel to load the system
(iii) Turn the centre spigot clockwise to raise the system pressure
(iv) When the required pressure has been achieved (max 230 bar) tighten the lock nut

NOTE: Should the required pressure be exceeded, wind the adjuster back and increase again. **Never** wind the pressure downwards to set

b. Engine gauges replacement.

(i) There is a resistor fitted to all gauge power lines. This must be replaced after maintenance to prevent damage to the gauges.

6.0 TROUBLESHOOTING

6.1 Power pack engine will not start

a. Check battery condition.

b. Check diagnostics panel for fault LED showing (see fig. 2.)

6.2. Engine cuts out during running

a. Check diagnostics panel for fault LED showing and rectify (see fig. 2.)

6.3. Power pack does not generate any pressure

a. Check L.E.D. (11) to see if hydraulic oil is up to temperature (see figure 2). If not perform warm-up operation described in section 3.3.1.

b. Check operation of main valve in power pack by turning selector switch (5) to 'warm-up' on the instrumentation panel (fig. 2.) This gives 200 bar reading on pressure gauge.

c. Check fuses or electrical connections to valve block if no reading from (b).

d. Check operation of relief valve if no reading from (b).

e. Check operation of hand control pendant and fuses in electrical box if reading is O.K. in (b).

6.4. Power pack generates pressure but hammer does not run

a. Anvil not pushed fully up into hammer casing (see section 3.4.1.) or the dolly is not sitting correctly in the anvil (especially after transportation or laying on its side)

b. Air in hammer hydraulic system - see section 3.4.2.

c. Hammer has been allowed to overtravel - see section 3.4.4. to reset.

d. Damaged hose on control side of hammer - check by removing front leg guide for inspection.

e. Faulty bottom sensor assembly - lay the hammer on timber blocks on level stable ground on its rear leg guide then remove front leg guide and check bottom sensor as follows:-

   (i) Cam/spring operation - does the cam rotate/return freely and is the spring in good order.
   (ii) Check for correct lift on valve roller (4mm)
   (iii) Check 'trip' arrangement for correct function (part 2-083-00-04 & 1-036-00-05)

(iv) It is possible to work the hammer for diagnostic purposes whilst it is laying on the ground. However, extreme caution must be exercised when doing so as incorrect operation will cause hammer damage. Always ensure the pendant is in MANUAL mode and NOT automatic mode. The anvil must be in the 'up' position so as to ensure the trip device is 'off'. The hammer can be pressurised by 'tapping' the 'start' push button on the pendant (power pack running) very gradually building up enough pressure to move the drop weight. If the button is held for too long the drop weight will possibly impact the inside top of the hammer - not a good idea!

However, by careful application of this method it is possible to check pressure is reaching the relevant sensor. If it is not, then the problem may be with the overtravel valve (part 1-084-00-02) not allowing oil flow to the control side of the hammer. This can be confirmed by removing the main pressure feed to either sensor - no oil flow when pressurising the system indicates overtravel valve problems and this item should be removed for inspection. (The overtravel valve can be removed through the wide slot in the side of the hammer encased by the rear leg guide and the hammer will require turning over to do this). Turn the power pack off before removal.

When checking the overtravel valve first check the small restrictor/dowel on its top face for any blockage. The valve is unlikely to be faulty inside and if this is suspected the unit should be returned to the manufacturer for checking.

If pressure is reaching the sensor check that the pilot signal from the sensor is reaching the main control valve block at the top of the hammer when the roller valve is operated. If not, remove and inspect the roller valve.

f. If this all appears to be in order check the top sensor mechanism in a similar manner to that described in e. (i) and (ii) above as it may be that the top sensor is jammed on.

Note: The spool inside the roller valve and the roller shaft are not connected so even though the roller returns when operated it does not follow that the spool has returned. Check the tension on the roller shaft, if there is none the spool may be stuck open.

g. If all appears well the problem may be with the main control valve spool. Contact the manufacturer for further details.

6.5 Hammer will lift but not drop

a. Has the hammer been allowed to overtravel. Check reset - see section 3.4.4.

b. Air in hammer hydraulic system - see section 3.4.2.

c. Damaged 'looped' hose from sensor assembly - check by removing front leg guide for inspection.

d. Faulty top sensor assembly - see 6.4.e. as diagnosis is similar to faulty bottom sensor assembly.

e. Faulty bottom sensor assembly i.e. valve is staying on (see section 6.4.f. for similar diagnosis)

6.6 Hammer runs erratically

a. Air in hydraulic system - see section 3.4.2.

b. 'Cold' hydraulic oil - see section 3.4.4.

c. Accumulator pressures incorrect or bladders damaged.
See Appendix 7.2.High pressure accumulator - 100 bar (2 off)
Low pressure accumulator - 3 bar (2 off)

d. Blocked filter on hammer - see section 4.2.b.

e. Not enough hydraulic flow/pressure from power pack - check flow rate gauge and pressure gauge.

f. One or both sensors damaged/contaminated - see sections 6.4 and 6.5,

6.7 Excessive hose 'jumping'

Check accumulator pressures/condition - see Appendix 7.2.

6.8 Hammer 'jumping' excessively on pile top - reduce stroke immediately and/or stop piling

a. Too much hydraulic oil input - set to 150 l/min.

b. 'Cold' hydraulic oil - see section 3.4.4 and reduce stroke. To warm the oil see section 3.3.1.

c. Stroke adjuster set too high - reduce **immediately** to continue working.

d. Suspension blocks (2-025-00-01) and ring (2-025-00-05) damaged. Inspect and replace immediately, if necessary.

e. Incorrect operation of top sensor assembly i.e. cam wear and/or incorrect roller travel.

6.9 Stroke height indicator will not move

a. With the power pack running and control pendant connected, check pressure gauges when '↑' and '↓' are pressed. If no readings, check relevant valve and wiring/fuses in power pack.

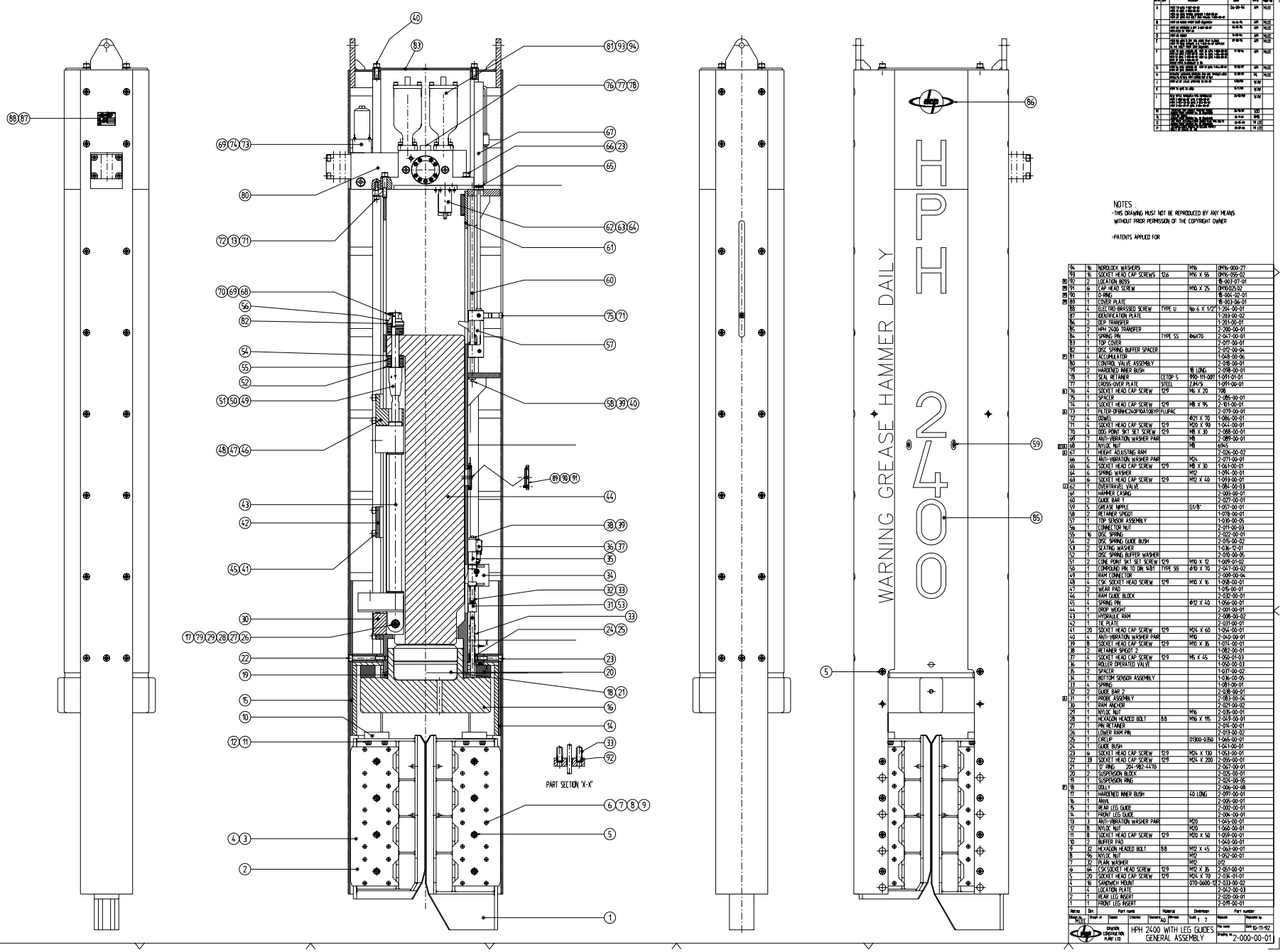
b. If readings are O.K., check hoses to hammer. If these are O.K., check restrictor orifices for blockages - these are the male/male adaptors located on the inlet manifold

c. If these are clear remove front leg guide and check height adjusting ram (2-026-00-01) and top sensor assembly.

APPENDIX 7.1 -

HPH 2400 HYDRAULIC HAMMER

PARTS LIST



Rev	Qty	Part name	Material	Dimension	Part number
	16	NORDLOCK WASHERS		M16	OM16-000-27
	16	SOCKET HEAD CAP SCREWS	12.6	M16 X 55	OM16-055-02
	2	LOCATION BOSS			16-003-07-01
	6	CAP HEAD SCREW		M10 X 25	OM10-025-02
	1	O-RING			16-004-02-01
	1	COVER PLATE			16-003-06-01
	4	ELECTRO-BRASSED SCREW	TYPE U	No 6 X 1/2"	1-204-00-01
	1	IDENTIFICATION PLATE			1-203-00-02
	2	DCP TRANSFER			1-201-00-01
	2	HPH 2400 TRANSFER			2-200-00-01
	1	SPRING PIN	TYPE SS	Ø6X70	2-047-00-01
	1	TOP COVER			2-017-00-01
	1	DSC SPRING BUFFER SPACER			2-012-00-04
	4	ACCUMULATOR			1-048-00-06
	1	CONTROL VALVE ASSEMBLY			2-018-00-01
	2	HARDENED INNER BUSH		18 LONG	2-098-00-01
	1	SEAL RETAINER	CETOP 5	990-111-007	1-091-00-01
	1	CROSS-OVER PLATE	STEEL	ZAM-5	1-091-00-01
	4	SOCKET HEAD CAP SCREW	12.9	M6 X 20	708
	1	SPACER			2-085-00-01
	4	SOCKET HEAD CAP SCREW	12.9	M8 X 95	2-101-00-01
	1	FILTER-DFBHMC24GPBDA10BYP	FLUPAC		2-079-00-01
	4	DOWEL		Ø21 X 70	1-086-00-01
	4	SOCKET HEAD CAP SCREW	12.9	M20 X 90	1-041-00-01
	3	DOG POINT SKT SET SCREW	12.9	M8 X 30	2-088-00-01
	7	ANTI-VIBRATION WASHER PAIR		M8	2-089-00-01
	3	NYLOC NUT		M8	6965
	1	HEIGHT ADJUSTING RAM			2-026-00-02
	5	ANTI-VIBRATION WASHER PAIR		M24	2-071-00-01
	6	SOCKET HEAD CAP SCREW	12.9	M8 X 30	1-061-00-01
	6	SPRING WASHER		M12	1-094-00-01
	6	SOCKET HEAD CAP SCREW	12.9	M12 X 40	1-093-00-01
	1	OVERTRAVEL VALVE			1-084-00-03
	1	HAMMER CASING			2-003-00-01
	2	GUIDE BAR 1			2-027-00-01
	5	GREASE NIPPLE		G1/8"	1-057-00-01
	2	RETAINER SPIGOT			1-078-00-01
	1	TDP SENSOR ASSEMBLY			1-030-00-05
	1	CONNECTOR NUT			2-011-00-03
	16	DSC SPRING			2-022-00-01
	2	DSC SPRING GUIDE BUSH			2-015-00-02
	2	SEATING WASHER			1-036-12-01
	2	DSC SPRING BUFFER WASHER			2-010-00-05
	2	CONE POINT SKT SET SCREW	12.9	M10 X 12	1-009-01-02
	1	COMPOUND PIN TO DIN 1481	TYPE SS	Ø10 X 70	2-047-00-02
	1	RAM CONNECTOR			2-009-00-06
	4	CSK SOCKET HEAD SCREW	12.9	M10 X 16	1-058-00-01
	2	WEAR PAD			1-015-00-01
	1	RAM GUIDE BLOCK			2-032-00-01
	4	SPRING PIN		Ø12 X 40	1-056-00-01
	1	DROP WEIGHT			2-001-00-01
	1	HYDRAULIC RAM			2-008-00-02
	1	TIE PLATE			2-031-00-01
	20	SOCKET HEAD CAP SCREW	12.9	M24 X 60	1-054-00-01
	4	ANTI-VIBRATION WASHER PAIR		M16	2-040-00-01
	8	SOCKET HEAD CAP SCREW	12.9	M10 X 35	1-074-00-01
	2	RETAINER SPIGOT 2			1-082-00-01
	4	SOCKET HEAD CAP SCREW	12.9	M6 X 45	1-060-01-03
	1	ROLLER OPERATED VALVE			1-092-00-03
	2	SPACER			1-037-00-02
	1	BOTTOM SENSOR ASSEMBLY			1-036-00-05
	4	SPRING			1-081-00-01
	2	GUIDE BAR 2			2-028-00-01
	1	PROBE ASSEMBLY			2-083-00-04
	1	RAM ANCHOR			2-021-00-02
	1	NYLOC NUT		M16	2-035-00-01
	1	HEXAGON HEADED BOLT	8.8	M16 X 115	2-043-00-01
	1	PIN RETAINER			2-014-00-01
	1	LOWER RAM PIN			2-013-00-02
	1	CIRCLIP		D1300-0350	1-065-00-01
	1	GUIDE BUSH			1-041-00-01
	6	SOCKET HEAD CAP SCREW	12.9	M24 X 130	1-063-00-01
	33	SOCKET HEAD CAP SCREW	12.9	M24 X 200	2-055-00-01
	1	'O' RING 204-982-4470			2-067-00-01
	2	SUSPENSION BLOCK			2-025-00-01
	1	SUSPENSION RING			2-024-00-05
	1	DOLLY			2-006-00-08
	1	HARDENED INNER BUSH		40 LONG	2-097-00-01
	1	ANVIL			2-005-00-01
	1	REAR LEG GUIDE			2-002-00-01
	1	FRONT LEG GUIDE			2-004-00-01
	3	ANTI-VIBRATION WASHER PAIR		M20	1-055-00-01
	8	NYLOC NUT		M20	1-060-00-01
	8	SOCKET HEAD CAP SCREW	12.9	M20 X 50	1-059-00-01
	2	BUFFER PAD			1-040-00-01
	32	HEXAGON HEADED BOLT	8.8	M12 X 45	2-063-00-01
	96	NYLOC NUT		M12	1-062-00-01
	32	PLAIN WASHER		M12	1012
	64	CSK SOCKET HEAD SCREW	12.9	M12 X 35	2-051-00-01
	20	SOCKET HEAD CAP SCREW	12.9	M24 X 70	2-034-01-01
	16	SANDWICH MOUNT		070-0600-12	2-033-00-02
	4	LOCATION PLATE			2-042-00-03
	1	REAR LEG INSERT			2-020-00-01
	1	FRONT LEG INSERT			2-019-00-01

NOTES :
-THIS DRAWING MUST NOT BE REPRODUCED BY ANY MEANS WITHOUT PRIOR PERMISSION OF THE COPYRIGHT OWNER

-PATENTS APPLIED FOR

Rev	Qty	Description	Date	Appd	Drawing No.
A			06-09-94	AM	PA1/E
B			16-04-96	AM	PA1/E
C			16-04-96	AM	PA1/E
D			16-04-96	AM	PA1/E
E			09-09-96	AM	PA1/E
F			17-10-96	AM	PA1/E
G			12-02-97	AM	PA1/E
H			12-08-97	HL	PA1/E
J			2/06/98	RJW	
K			12/11/98	RJW	
L			21/12/98	RJW	
M			21/12/98	CBD	
N			21-7-99	BMB	
O			26-05-00	M LEE	
P			29-01-01	M LEE	

Drawing No. PA1/E	Drawn JP	Checked	Checked	Manufacturing App	Approved	Scale 1 : 7	Released	Released by
							File name	Date 10-11-92

DARLEY ENGINEERING PLANT LTD

HPH 2400 WITH LEG GUIDES
GENERAL ASSEMBLY

Drawing No. 2-000-00-01

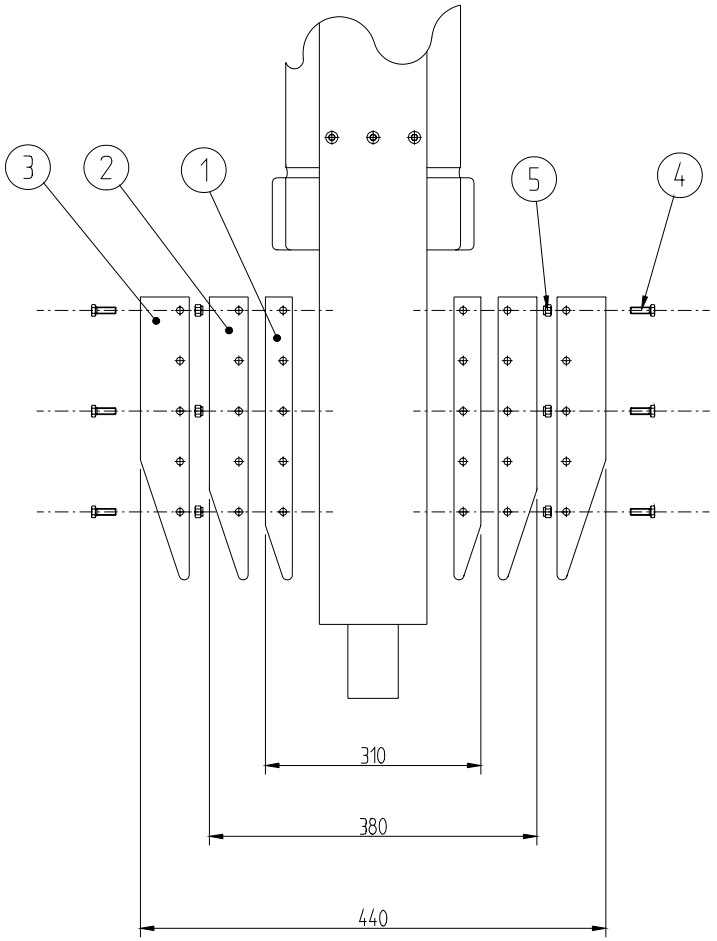
50	1	COMPOUND PIN TO DIN 1481	TYPE SS	Φ10 X 70	2-047-00-02
49	1	RAM CONNECTOR			2-009-00-04
48	4	CSK. SOCKET HEAD SCREW	12.9	M10 X 16	1-058-00-01
47	2	WEAR PAD			1-015-00-01
46	1	RAM GUIDE BLOCK			2-032-00-01
45	4	SPRING PIN		Φ12 X 40	1-056-00-01
44	1	DROP WEIGHT			2-001-00-01
43	1	HYDRAULIC RAM			2-008-00-02
42	1	TIE PLATE			2-031-00-01
41	20	SOCKET HEAD CAP SCREW	12.9	M24 X 60	1-054-00-01
40	4	ANTI-VIBRATION WASHER PAIR		M10	2-040-00-01
39	8	SOCKET HEAD CAP SCREW	12.9	M10 X 35	1-074-00-01
38	2	RETAINER SPIGOT 2			1-082-00-01
37	4	SOCKET HEAD CAP SCREW	12.9	M5 X 45	1-050-01-03
36	1	ROLLER OPERATED VALVE			1-050-00-03
35	2	SPACER			1-037-00-02
34	1	BOTTOM SENSOR ASSEMBLY			1-036-00-05
33	4	SPRING			1-081-00-01
32	2	GUIDE BAR 2			2-038-00-01
] 31	1	PROBE ASSEMBLY			2-083-00-04
30	1	RAM ANCHOR			2-021-00-02
29	1	NYLOC NUT		M16	2-035-00-01
28	1	HEXAGON HEADED BOLT	8.8	M16 X 115	2-049-00-01
27	1	PIN RETAINER			2-014-00-01
26	1	LOWER RAM PIN			2-013-00-02
25	1	CIRCLIP		D1300-0350	1-065-00-01
24	1	GUIDE BUSH			1-041-00-01
23	6	SOCKET HEAD CAP SCREW	12.9	M24 X 130	1-053-00-01
22	33	SOCKET HEAD CAP SCREW	12.9	M24 X 200	2-055-00-01
21	1	'O' RING 204-982-4470			2-067-00-01
20	2	SUSPENSION BLOCK			2-025-00-01
19	1	SUSPENSION RING			2-024-00-05
] 18	1	DOLLY			2-006-00-08
17	1	HARDENED INNER BUSH		40 LONG	2-097-00-01
16	1	ANVIL			2-005-00-01
15	1	REAR LEG GUIDE			2-002-00-01
14	1	FRONT LEG GUIDE			2-004-00-01
13	3	ANTI-VIBRATION WASHER PAIR		M20	1-045-00-01
12	8	NYLOC NUT		M20	1-060-00-01
11	8	SOCKET HEAD CAP SCREW	12.9	M20 X 50	1-059-00-01
10	2	BUFFER PAD			1-040-00-01
9	32	HEXAGON HEADED BOLT	8.8	M12 X 45	2-063-00-01
8	96	NYLOC NUT		M12	1-052-00-01
7	32	PLAIN WASHER		M12	012
6	64	CSK.SOCKET HEAD SCREW	12.9	M12 X 35	2-051-00-01
5	20	SOCKET HEAD CAP SCREW	12.9	M24 X 70	2-034-01-01
4	16	SANDWICH MOUNT		070-0600-12	2-033-00-02
3	4	LOCATION PLATE			2-042-00-03
2	1	REAR LEG INSERT			2-020-00-01
1	1	FRONT LEG INSERT			2-019-00-01
Ref.no.	Qnt.	Part name	Material	Dimension	Part number

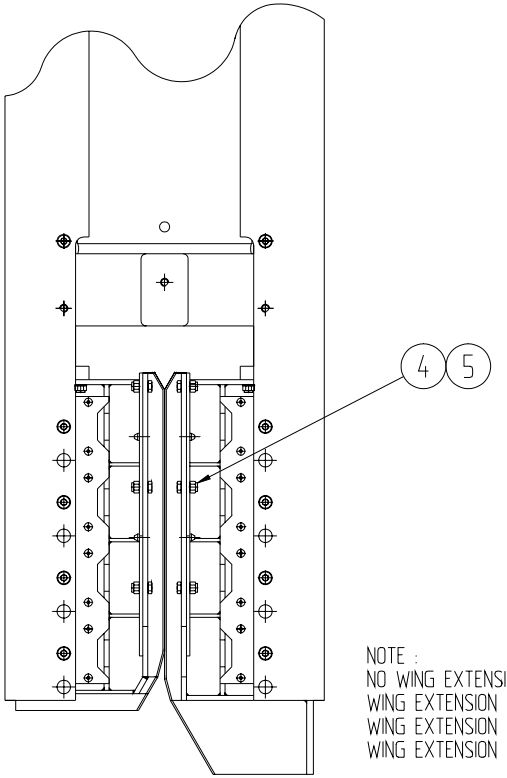
Design by M.LEE	Drawn at	Copied	Checked	Standard A0	Affirmed	Scale 1 : 7	Replace	Replaced by
DAWSON CONSTRUCTION PLANT LTD.	HPH 2400 WITH LEG GUIDES GENERAL ASSEMBLY						File name	Date 10-11-92
							Drawing no. 2-000-00-01	

94	16	NORDLOCK WASHERS		M16	0M16-000-27
93	16	SOCKET HEAD CAP SCREWS	12,6	M16 X 55	0M16-055-02
92	2	LOCATION BOSS			18-003-07-01
91	6	CAP HEAD SCREW		M10 X 25	0M10.025.02
90	1	O-RING			18-004-02-01
89	1	COVER PLATE			18-003-06-01
88	4	ELECTRO-BRASSED SCREW	TYPE U	No 6 X 1/2"	1-204-00-01
87	1	IDENTIFICATION PLATE			1-203-00-02
86	2	DCP TRANSFER			1-201-00-01
85	2	HPH 2400 TRANSFER			2-200-00-01
84	1	SPRING PIN	TYPE SS	Φ6X70	2-047-00-01
83	1	TOP COVER			2-017-00-01
82	1	DISC SPRING BUFFER SPACER			2-012-00-04
81	4	ACCUMULATOR			1-048-00-06
80	1	CONTROL VALVE ASSEMBLY			2-018-00-01
79	2	HARDENED INNER BUSH		18 LONG	2-098-00-01
78	1	SEAL RETAINER	CETOP 5	990-111-007	1-091-01-01
77	1	CROSS-OVER PLATE	STEEL	ZJM/S	1-091-00-01
76	4	SOCKET HEAD CAP SCREW	12.9	M6 X 20	708
75	1	SPACER			2-085-00-01
74	4	SOCKET HEAD CAP SCREW	12.9	M8 X 95	2-101-00-01
73	1	FILTER-DFBNHC240P10A1.0BYP	FLUPAC		2-079-00-01
72	4	DOWEL		Φ21 X 70	1-086-00-01
71	4	SOCKET HEAD CAP SCREW	12.9	M20 X 90	1-044-00-01
70	3	DOG POINT SKT SET SCREW	12.9	M8 X 30	2-088-00-01
69	7	ANTI-VIBRATION WASHER PAIR		M8	2-089-00-01
68	3	NYLOC NUT		M8	6945
67	1	HEIGHT ADJUSTING RAM			2-026-00-02
66	5	ANTI-VIBRATION WASHER PAIR		M24	2-071-00-01
65	6	SOCKET HEAD CAP SCREW	12.9	M8 X 30	1-061-00-01
64	6	SPRING WASHER		M12	1-094-00-01
63	6	SOCKET HEAD CAP SCREW	12.9	M12 X 40	1-093-00-01
62	1	OVERTRAVEL VALVE			1-084-00-03
61	1	HAMMER CASING			2-003-00-01
60	2	GUIDE BAR 1			2-027-00-01
59	5	GREASE NIPPLE		G1/8"	1-057-00-01
58	2	RETAINER SPIGOT			1-078-00-01
57	1	TOP SENSOR ASSEMBLY			1-030-00-05
56	1	CONNECTOR NUT			2-011-00-03
55	16	DISC SPRING			2-022-00-01
54	2	DISC SPRING GUIDE BUSH			2-015-00-02
53	2	SEATING WASHER			1-036-12-01
52	1	DISC SPRING BUFFER WASHER			2-010-00-05
51	2	CONE POINT SKT SET SCREW	12.9	M10 X 12	1-009-01-02
Ref.no.	Qnt.	Part name	Material	Dimension	Part number

Design by M.LEE	Drawn at	Copied	Checked	Standard A0	Affirmed	Scale 1 : 7	Replace	Replaced by
DAWSON CONSTRUCTION PLANT LTD.			HPH 2400 WITH LEG GUIDES GENERAL ASSEMBLY				File name	Date 10-11-92
							Drawing no. 2-000-00-01	

Rf.nr	Qnt.	Revision	Date	Intro.	Appr.by





NOTE :
NO WING EXTENSIONS = STANDARD (E.G. 305X305 U.C.)
WING EXTENSION 1 = LARSSEN 6 FOR EXAMPLE
WING EXTENSION 2 = LARSSEN W's & LARSSEN 600'S FOR EXAMPLE
WING EXTENSION 3 = BSC FX & ARBED AZ FOR EXAMPLE

Ref.no.	Qnt.	Part name	Material	Dimension	Remark
5	12	NYLOC NUT		M20	1-060-00-01
4	12	HEX. HEAD BOLT	8.8	M20 X 60	'709
3	4	WING EXTENSION 3		440	2-096-03-01
2	4	WING EXTENSION 2		380	2-096-02-01
1	4	WING EXTENSION 1		310	2-096-01-01

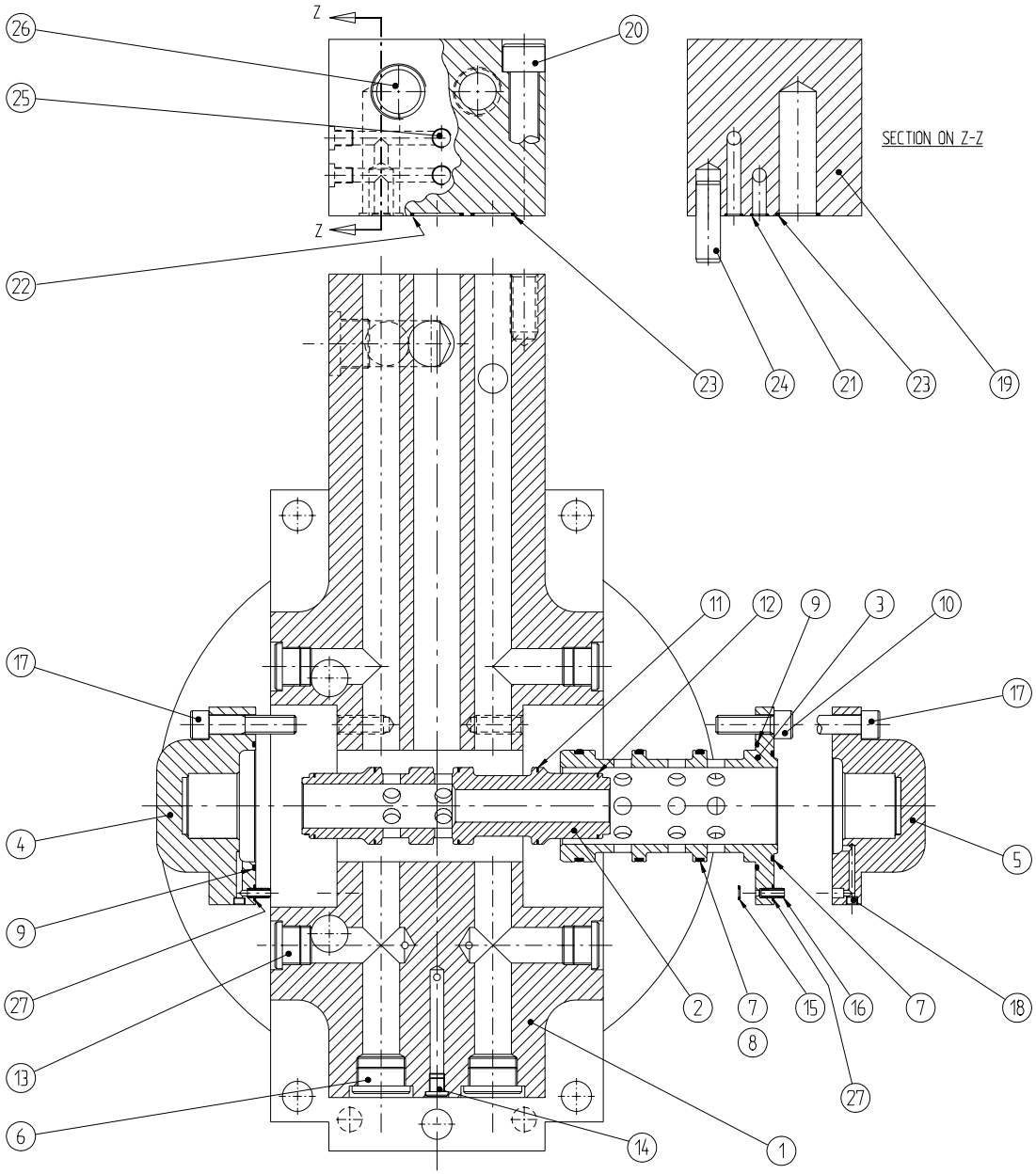
Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
M.LEE				A3		1 : 20		

DAWSON CONSTRUCTION PLANT LTD.

OPTIONAL WING EXTENSIONS FOR HPH2400

File name | Date 16-12-93

Drawing no. 2twingparts



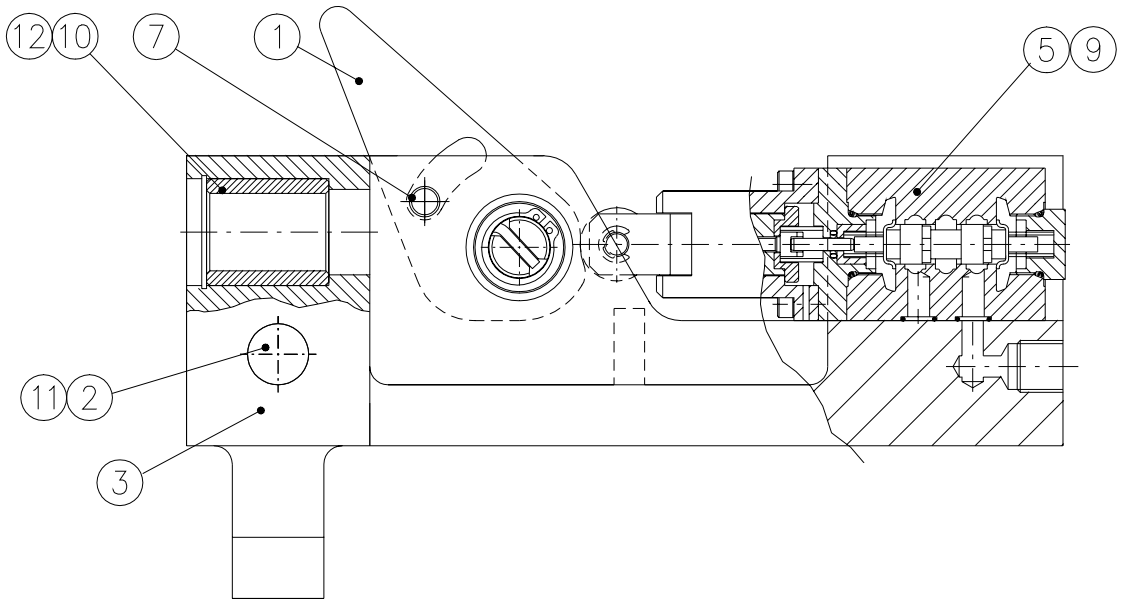
Rf.nr	Qnt.	Revision	Date	Intro.	Appr by
A		ITEM 11 WAS SE-GE-026 AUTISA RING	14-03-95	API	MLEE
B		CLARIFIED PART DESCRIPTIONS	10-10-96	API	
C		INLET MANIFOLD UPDATED TO ISS2 IT 23 ORING REVD TO SUIT	14/09/98	WJW	
D		SEAL KIT NOTE ADDED	3/03/99	WJW	

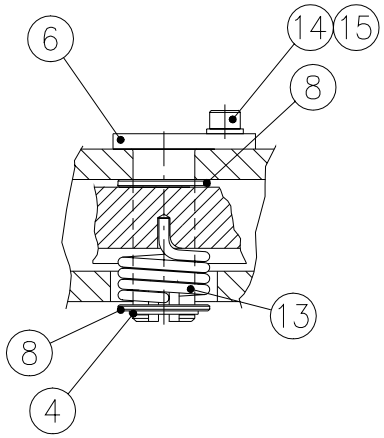
SERVICE SEAL KIT
PT. NUMBER : 2-018-50-01 THIS INCLUDES '0' RINGS FOR PREVIOUS BUILD LEVEL.

Ref.no.	Qnt.	Part name	Material	Dimension	Remark
27	2	'0' RING 204-010-4470			1-018-29-01
26	1	BLANKING PLUG	VS-R1 1/2WD	1 1/2" BSP	2-018-29-01
25	3	BLANKING PLUG	VS-R 3/8WD	3/8" BSP	1-018-28-01
24	2	DOWEL		ø 21	1-086-00-01
23	3	'0' RING 206-338-4470			6-018-31-01
22	1	'0' RING 206-340-4470			2-018-26-01
21	2	'0' RING 204-012-4470			1-018-25-01
20	4	SOCKET HEAD CAP SCREW	12.9	M24 x 165	2-018-24-01
19	1	INLET MANIFOLD			2-018-23-02
18	2	BLANKING PLUG		1/8" BSPT	1-018-22-01
17	15	SOCKET HEAD CAP SCREW	12.9	M16 x 75	2-018-19-01
16	2	HOLLOW DOWEL			1-018-21-01
15	2	'0' RING 204-008-4470			1-018-20-01
14	6	BLANKING PLUG	VS-R 1/4WD	1/4" BSP	1-018-18-01
13	4	BLANKING PLUG	VS-R 1 WD	1" BSP	1-064-00-01
12	2	RING SET	YAMAHA	5x4-11611-02	2-018-14-01
11	3	RING SET	WISECO	2598 CD	2-018-13-01
10	2	SOCKET HEAD CAP SCREW	12.9	M16 x 50	2-018-11-01
9	2	'0' RING 206-654-4470			2-018-10-01
8	6	A.E.R. 252-238-1670			2-018-09-01
7	4	'0' RING 200-238-4470			2-018-08-01
6	5	BLANKING PLUG	VS-R1 1/4WD	1 1/4" BSP	1-018-07-01
5	1	END CAP 1			2-018-05-01
4	1	END CAP 2			2-018-04-01
3	1	SLEEVE			2-018-03-01
2	1	PISTON			2-018-02-01
1	1	VALVE BLOCK			2-018-01-01

Design by MLEE	Drawn at	Copied	Checked	Standard A2	Affirmed	Scale 1 : 2.5	Replace / Replaced by
DAWSON CONSTRUCTION PLANT LTD.	HAMMER CONTROL VALVE ASSEMBLY						File name / Date 19-11-92
							Drawing no. 2-018-00-01

Rf.nr	Qnt.	Revision	Date	Intro.	Appr.by
A		9 WAS 1-050-00-02 5 WAS 1-050-01-02 M5x50	27-09-96	API	M.LEE





MECHANISM COMPONENTS

NOTES :

BEFORE ASS'Y OF MECHANISM COMPONENTS CLEAN
THE M6 HOLE IN ITEM 3 & ITEM 14 WITH LOCTITE 7063
APPLY ACTIVATOR 7471 TO THE AFOREMENTIONED ONLY IF
THE ASS'Y IS TO BE USED WITHIN 24 HRS OF ASS'Y

USE A SOFT FACED HAMMER TO FIT ITEM 6
APPLY A COPPER BASED ANTI-SEIZE COMPOUND SUCH AS ROCOL J 166
TO SPACER WASHERS ITEM 8 AND TORSION SPRING ITEM 13

APPLY LOCTITE STUDLOCK 270 TO SOCKET HEAD CAP SCREW ITEM 14 AND
TIGHTEN TO A TORQUE OF 16 Nm
CIRCLIP ITEM 4 TO BE INSTALLED AS SHOWN SO THAT THE GAP IS NOT
COINCIDENT WITH THE SLOT IN THE CAM CENTRE SHAFT ITEM 6

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WITHOUT PRIOR PERMISSION OF THE COPYRIGHT OWNER
PATENTS APPLIED FOR.

Ref.no.	Qnt.	Part name	Material	Dimension	Part number
16	2	BLANKING PLUG			1-018-18-01
15	1	PLAIN WASHER		M6	622
14	1	SOCKET HEAD CAP SCREW	12.9	M6 x 16	623
13	1	TORSION SPRING			1-030-18-01
12	4	CIRCLIP		D1300-0350	1-065-00-01
11	1	CIRCLIP		D1300-0200	1-030-11-01
10	4	GUIDE BUSH			1-030-10-01
9	1	ROLLER OPERATED VALVE	HFA 2B2		1-050-00-03
8	2	SPACER WASHER		2 THICK	1-030-21-01
7	1	SPRING PIN		ϕ10 x 50	1-030-07-01
6	1	CAM CENTRE SHAFT			1-030-06-04
5	4	SOCKET HEAD CAP SCREW	12.9	M5 x 45	1-050-01-03
4	1	CIRCLIP		D1400-0200	1-036-04-01
3	1	VALVE MOUNTING BLOCK			1-030-03-03
2	1	LINK PIN			1-030-02-01
1	1	CAM 2			1-030-01-03

Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
API				A3		1 : 1.5		

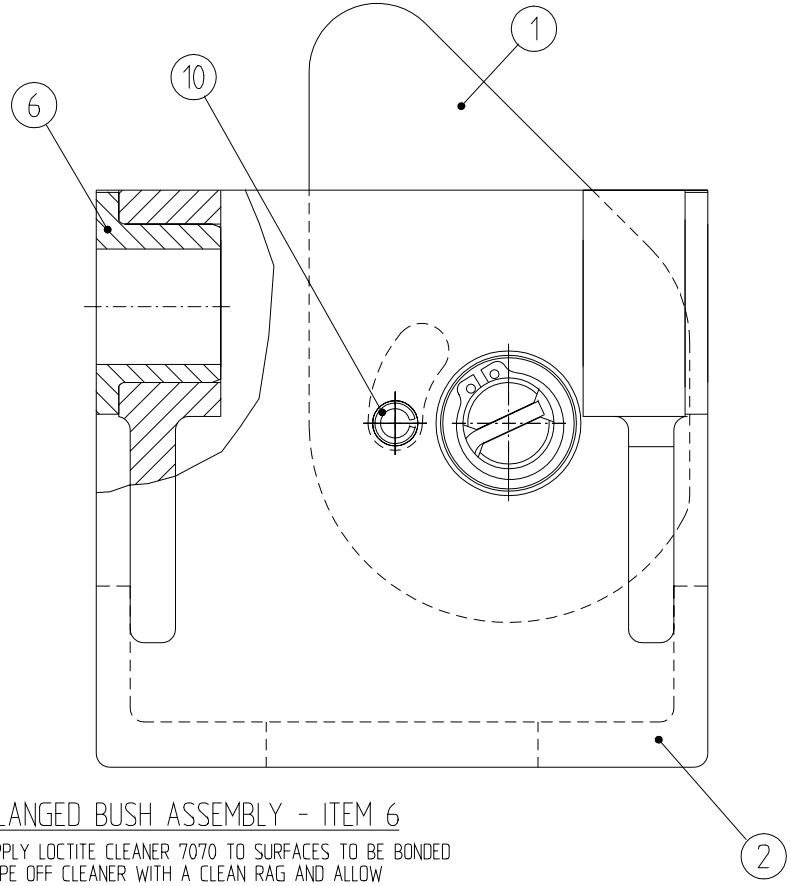
DAWSON CONSTRUCTION PLANT LTD.

TOP SENSOR ASS'Y
TORSION SPRING VERSION

File name | Date 07-11-95

Drawing no. 1-030-00-05

Rf.nr	Qnt.	Revision	Date	Intro.	Appr.by
A		ITEM 1 WAS 1-036-01-02	15-08-96	API	



FLANGED BUSH ASSEMBLY - ITEM 6

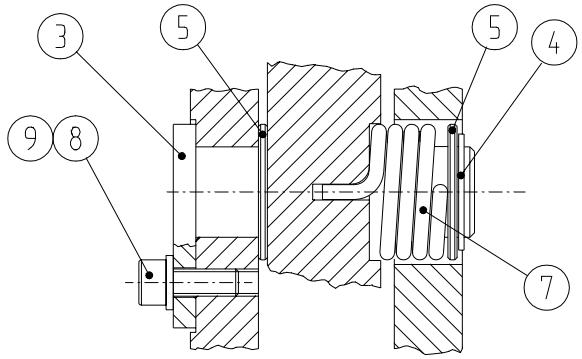
APPLY LOCTITE CLEANER 7070 TO SURFACES TO BE BONDED
WIPE OFF CLEANER WITH A CLEAN RAG AND ALLOW
TO DRY 2-3 MINUTES

DO NOT USE CLEANER 7063 AS
THIS IS SOLVENT BASED AND WILL ATTACK
THE NYLON FLANGED BUSHES

APPLY LOCTITE ACTIVATOR 7471 TO SURFACES TO BE BONDED
ALLOW ACTIVATOR TO EVAPORATE FOR 2-3 MINUTES
UNTIL SURFACES ARE DRY

APPLY LOCTITE 601 TO BOTH SUFACES TO BE BONDED
INTSALL FLANGED BUSH INTO CAM CARRIAGE
UNTIL SURACES ARE FLUSH

REMOVE ANY EXCESS LOCTITE FROM THE JOINT
WHILST IT IS STILL WET



MECHANISM COMPONENTS

MECHANISM ASSEMBLY

BEFORE ASS'Y OF MECHANISM COMPONENTS CLEAN
THE M6 HOLE IN ITEM 2 & ITEM 8 WITH LOCTITE 7063
APPLY ACTIVATOR 7471 TO THE AFOREMENTIONED ONLY IF
THE ASS'Y IS TO BE USED WITHIN 24 HRS OF ASS'Y

USE A SOFT FACED HAMMER TO FIT ITEM 3
APPLY A COPPER BASED ANTI-SEIZE COMPOUND SUCH AS ROCOL J 166
TO SPACER WASHERS ITEM 5 AND TORSION SPRING ITEM 7

APPLY LOCTITE STUDLOCK 270 TO SOCKET HEAD CAP SCREW ITEM 8 AND
TIGHTEN TO A TORQUE OF 16 Nm
CIRCLIP ITEM 4 TO BE INSTALLED AS SHOWN SO THE GAP IS NOT
COINCIDENT WITH THE SLOT IN THE CAM CENTRE SHAFT ITEM 3

Ref.no.	Qnt.	Part name	Material	Dimension	Part number
10	1	SPRING PIN		ϕ10 x 50	1-030-07-01
9	1	PLAIN WASHER		M6	622
8	1	SOCKET HEAD CAP SCREW	12.9	M6 x 16	623
7	1	TORSION SPRING			1-030-18-01
6	4	FLANGED BUSH			1-036-13-01
5	2	SPACER WASHER		2 THICK	1-030-21-01
4	1	CIRCLIP		D1400-0200	1-036-04-01
3	1	CAM CENTRE SHAFT			1-036-03-03
2	1	CAM CARRIAGE			1-036-02-04
1	1	CAM 3			1-036-01-03

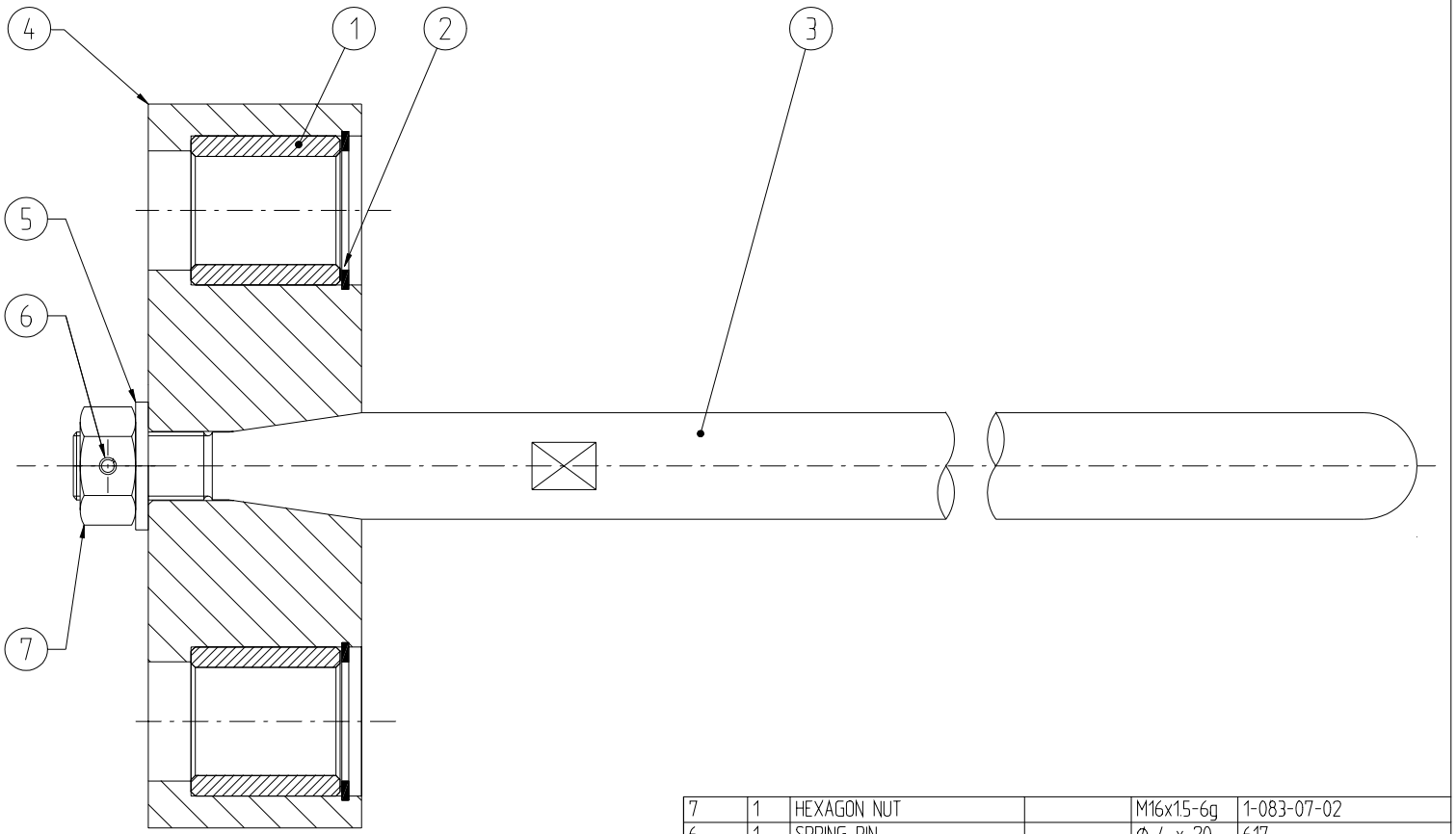
Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
API				A3		1 : 1	File name	Date 16-08-96

DAWSON CONSTRUCTION PLANT LTD.

BOTTOM SENSOR ASSEMBLY TORSION SPRING VERSION

Drawing no. 1-036-00-05

Rf.nr	Qnt.	Revision	Date	Intro.	Appr by



Ref.no.	Qnt.	Part name	Material	Dimension	Part Number
7	1	HEXAGON NUT		M16x1.5-6g	1-083-07-02
6	1	SPRING PIN		Φ 4 x 20	617
5	1	PLAIN WASHER		M16	4047
4	1	PROBE HEAD			1-083-01-02
3	1	PROBE PUSH ROD			2-083-02-03
2	2	CIRCLIP	D1300-0350		1-065-00-01
1	2	GUIDE BUSH			1-041-00-01

Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
API				A3		1 : 1		

DAWSON CONSTRUCTION PLANT LTD.

PROBE ASSEMBLY

File name | Date 31-08-94

Drawing no. 2-083-00-04

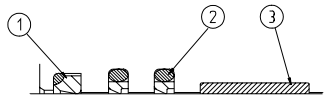
NOTES :

DRILL THRU' AND FIT ITEM 6 AFTER SECURING NUT ITEM 7.

-THIS DRAWING MUST NOT BE REPRODUCED BY ANY MEANS WITHOUT PRIOR PERMISSION OF THE COPYRIGHT OWNER
-PATENTS APPLIED FOR.

3RD ANGLE

Rf nr	Revision	Date	Appr by

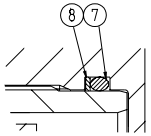


DETAIL A
SHOWING ORIENTATION OF SEALS

INSTALLATION OF ROD SEALS,ITEMS 1 & 2
INSERT O RING INTO GROOVE, ENSURING IT IS NOT TWISTED.
SQUEEZE SEAL INTO KIDNEY SHAPE & PLACE INTO GROOVE OVER O RING.
ALLOW SEAL TO SNAP BACK INTO SHAPE,& PRESS INTO GROOVE
OIL COPIOUSLY.

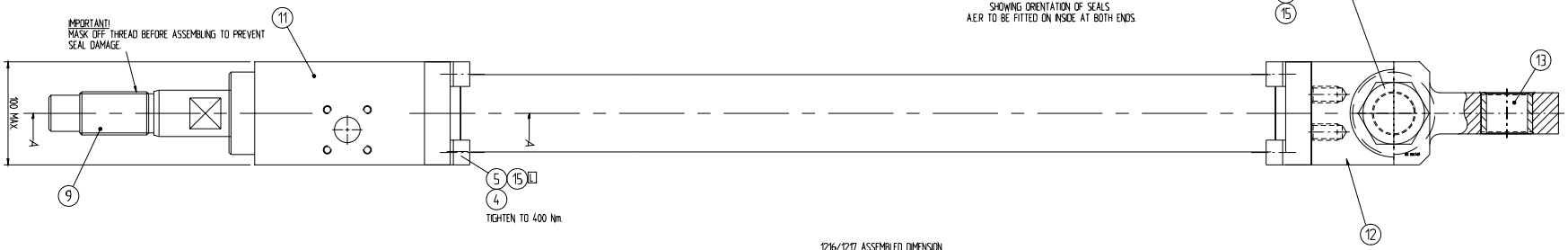
INSTALLATION OF WEAR STRIPS ,ITEM 3

FORM STRIP INTO DIAMETER SMALLER THAN BORE.
SLIDE INTO PLACE,KEEPING IT SQUARE & ALLOW IT
TO RECOVER TO GROOVE DIAMETER,PRESS BACK INTO GROOVE.
OIL COPIOUSLY.

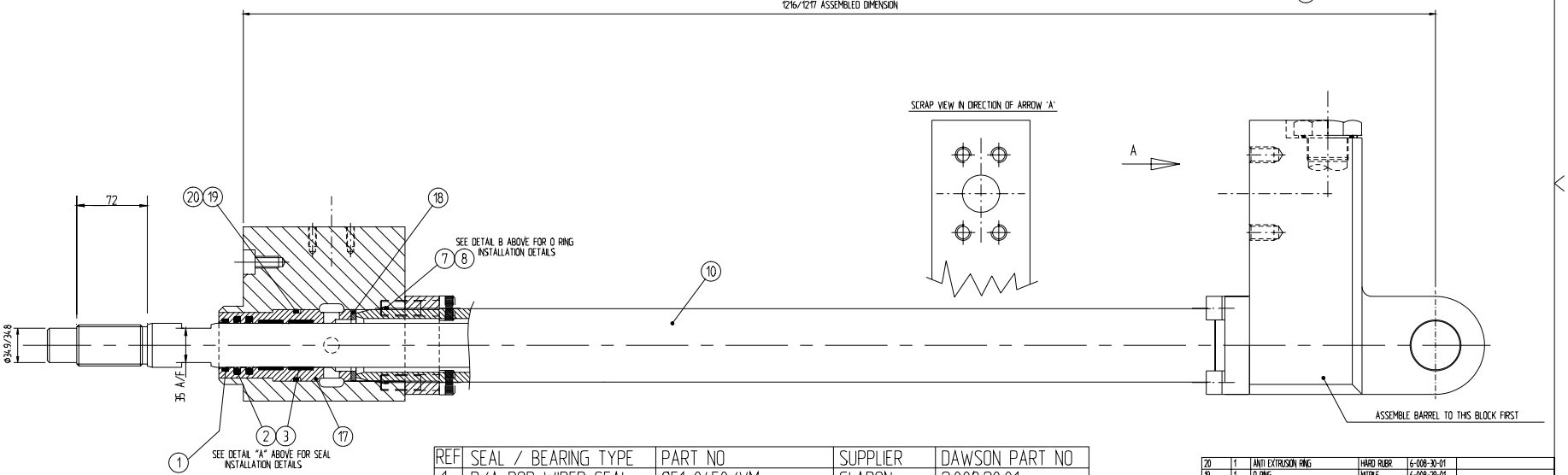


DETAIL B
SHOWING ORIENTATION OF SEALS
A.E.R TO BE FITTED ON INSIDE AT BOTH ENDS.

INSTALL M42 BLANKING PLUG & O RING
TORQUE TIGHTEN TO 375 Nm



1216/1277 ASSEMBLED DIMENSION



PART SECTION THRO' A-A

REF	SEAL / BEARING TYPE	PART NO	SUPPLIER	DAWSON PART NO
1	D/A ROD WIPER SEAL	951-0450/VM	CLARON	2.008.20.01
2	ZURCON RIMSEAL	CS60450/B	CLARON	2.008.21.01
3	BEARING RING	PBR 050045250/1260	CLARON	2.008.22.01

GENERAL NOTES

DIMENSIONS IN MILLIMETRES
RAM TO BE PRIMED WITH ZINC PHOSPHATE
DO NOT PAINT OVER HYDRAULIC INTERFACE , BORE OF INNER BUSH
OR PISTON ROD
FLUID PORTS TO BE PROTECTED WITH PLASTIC CAPS

PRESSURE TESTING

BOTH ENDS OF RAM INDEPENDENTLY
TO 350 BAR
CHECK INTEGRITY OF ALL SEALS

DCP PART NUMBER 2-008-00-03
ACTUAL WEIGHT DRY = 810kg.

L LOCTITING PROCEDURE

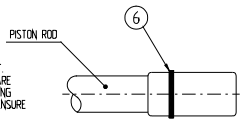
CLEAN PARTS TO BE LOCTITED USING LOCTITE 7063
ALLOW CLEANER TO DRY (2-3 MINUTES)

APPLY LOCTITE ACTIVATOR 7471 TO BOTH SURFACES
ALLOW ACTIVATOR TO DRY (2-3 MINUTES)

APPLY LOCTITE ADHESIVE 270 TO COMPONENTS AND ASSEMBLE

ADHERE TO ANY LOCTITE SAFETY RECOMMENDATIONS

INSTALLATION OF PISTON SEAL
SLIDE O RING INTO GROOVE ENSURING IT DOES NOT TWIST.
LUBRICATE SEAL & SLIDE ON TO PISTON KEEPING IT SQUARE
TO AXIS, & NOT ALLOWING IT TO TWIST. WHEN ASSEMBLING
PISTON TO CYLINDER KEEP ROD IN CENTRE OF BORE TO ENSURE
SEAL IS SIZED CORRECTLY.
OIL COPIOUSLY.



Ref.no.	Qnt	Description	Material	Part number	Manufacturer (if relevant)
20	1	ANTI EXTRUSION RING	HARD RUBR	6-008-30-01	
19	1	O RING	NITRILE	6-008-29-01	
18	1	TOLERANCE WASHER	ALLOY	6-008-28-01	
17	1	BUSH	PHBRONZE	6-008-27-01	
16	1	O RING	NITRILE	2-008-27-01	206-148-4470 48X2.5
15	A/R	LOCTITE 270		SEE NOTES	
14	1	PLUG		2-008-26-01	
13	1	BUSH		2-097-00-01	
12	1	BOTTOM BLOCK		6-008-06-02	
11	1	TOP BLOCK		6-008-05-03	
10	1	CYLINDER BARREL ASSEMBLY		2-008-04-02	
9	1	PISTON ROD ASSEMBLY		2-008-03-01	
8	2	ANTI-EXTRUSION RING	HARD RUBR	6-008-25-01	BS231 HRBUR
7	2	'O' RING	NITRILE	6-008-24-01	BS231 Ø730 X 35
6	1	PISTON SEAL		2-008-23-01	
5	8	CAP HEAD SCREW	12.9	M16 X 60	DIN6.060.02
4	8	NORDLOK WASHER		M16	DIN16-000-27
3	2	SLYDRING		2-008-22-01	
2	2	ROD SEAL		2-008-21-01	
1	1	EXCLUDER		2-008-20-01	

MACHINING TOLERANCES
UNLESS STATED OTHERWISE
X = +/- 0.5
X . X = +/- 0.25
X . XX = +/- 0.05
ANGLES +/- 0.5°
DIMENSIONS IN MILLIMETRES

Drawn by	Drawn at	Copied	Checked	Standard	Attested	Scale	Replace	Replaced by
DAB				A1		1 . 2		

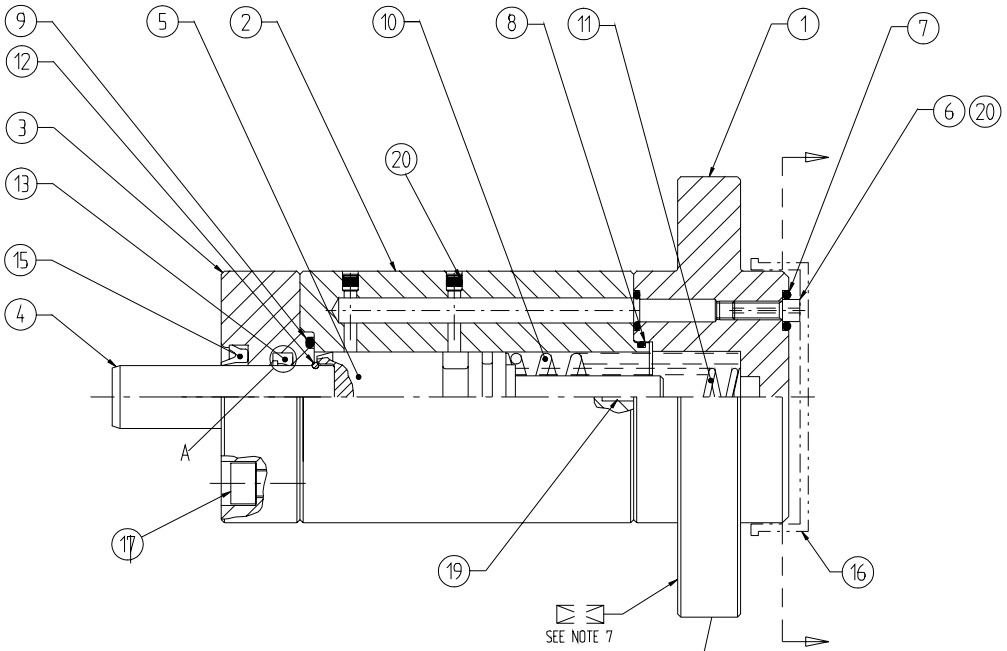
Dawson Construction Plant Ltd

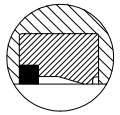
HYDRAULIC RAM
HPH2400 HYDRAULIC HAMMER

File name | Date 13.12.02

Drawing no. 2-008-00-03

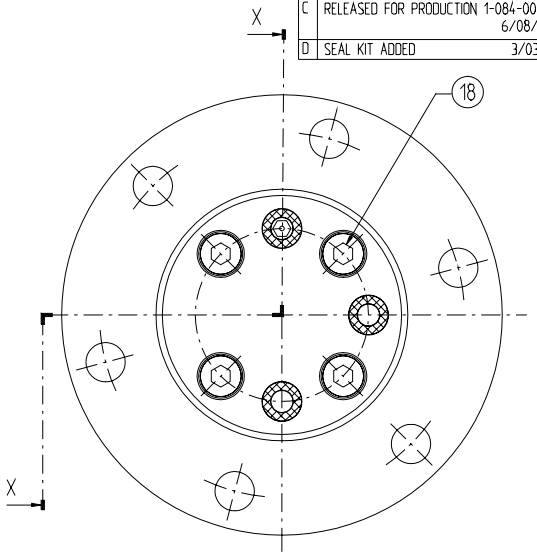
Rf.nr	Qnt	Revision	Date	Intro.	Appr by
A		SEE LAYER INFO-SEAL REMOVED	10-11-95	API	
B		ITEM 10 WAS 1-084-10-01, ITEM 9 WAS 1-084-09-01, ITEM 13 WAS 1-084-13-01, NOTES REVISED, TEST PROCEDURES ADDED. 27/11/97			WJW
C		RELEASED FOR PRODUCTION 1-084-00-03 6/08/98			WJW
D		SEAL KIT ADDED	3/03/99		WJW





DETAIL A
SHOWING ORIENTATION OF SEAL ITEM 13

STAMP ON : PART No., JOB No. (OR P/O No.) - SERIAL NO.
10mm HIGH LETTERS



ITEM 16 OMITTED FOR CLARITY

SERVICE SEAL KIT
PT.NUMBER 1-084-50-01 INCLUDES 'O' RING FOR PREVIOUS BUILD LEVEL

SEAL INSTALLATION INSTRUCTIONS.

ROD SEAL - ITEM 13

SQUEEZE THE SEAL RING TOGETHER TO FORM A KIDNEY SHAPE. PLACE THE SEAL RING IN THE GROOVE.

ROD WIPER - ITEM 15

SNAP THE SEAL INTO POSITION

ASSEMBLY NOTES

1. PLUNGER (ITEM 4) AND SEAL (ITEM 13) TO BE OILED BEFORE ASS'Y. PLUNGER TO BE KEPT AS PERPENDICULAR TO THE END CAP AS POSSIBLE DURING ASS'Y AS THE PLUNGER RESIZES THE SEAL.
2. ASSEMBLE ITS 7 & 19 TO ITEM 1, & IT 8 TO IT 2 USING CLEAN OIL BOLT TOGETHER USING ITS 18 & LOCTITE 242 TORQUE TIGHTEN TO 50 N/mm FIT IT 6, TORQUE TIGHTEN TO 20 N/mm.
3. LOAD ITS 10 & 11 ONTO PISTON IT 5, THEN USING CLEAN OIL ENTER ASSEMBLY INTO BORE IT 2. SECURE ENDCAP ASSY IT 3 TO PREVIOUS ASSY WITH IT 9, USING IT 17 & LOCTITE 242 TORQUE TIGHTEN TO 50 N/mm.
4. PHYSICAL TEST- SEE TEST PROCEDURE.
5. STATIC PRESSURE TEST- SEE TEST PROCEDURE
6. MASK OFF ITS. 4, 6 & 15, & DEGREASE, THEN PAINT WITH GREY HAMMERITE SMOOTH.
7. ENSURE HOLE IN ITEM 6 IS CLEAR OF LOCTITE BEFORE FITTING CAP IT 16

Ref.no.	Qnt.	Part name	Material	Dimension	Part number
20	4	KOENIG SEALING PLUG	MB700050		1-084-20-01
19	1	SPRING PIN		Φ3 x 18	2-026-06-05
18	4	SCREW SKT CAP HEAD		M8 x 60	088
17	4	SCREW SKT CAP HEAD		M8 x 40	6940
16	1	CAP (H86/053)	ALLIANCE		1-084-16-01
15	1	ROD WIPER (CSWM 20)	OIL SEALS		1-084-15-01
13	1	STEPSEAL CPI 110078-1	OIL SEALS		1-084-23-01
12	1	SNAP RING (RWM 0200)	BELLEVILLE		1-084-12-01
11	1	COMP'N SPRING (LC-080J-11)	LEE SPRINGS		1-084-11-01
10	1	COMP'N SPRING SPECIAL	LION SPRINGS		1-084-10-02
9	1	'O' RING (206-134-4470)	DOWTY	Φ34.00X2.5	1-084-09-02
8	1	'O' RING (200-026-4470)	DOWTY	Φ31.47x1.78	1-084-08-01
7	6	'O' RING (200-109-4470)	DOWTY	Φ7.6x2.62	1-084-07-01
6	1	SCREW SPECIAL CAP HEAD		M6	1-084-06-01
5	1	PISTON			1-084-05-01
4	1	PLUNGER-OVERTRAVEL VALVE			1-084-04-01
3	1	END CAP-OVERTRAVEL VALVE			1-084-03-01
2	1	BODY-OVERTRAVEL VALVE			1-084-02-01
1	1	FLANGE			1-084-01-01

Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
WJW				A2		1 : 1		

DAWSON CONSTRUCTION PLANT LTD.

ASSEMBLY
OVERTRAVEL VALVE

File name | Date 27/11/97

Drawing no. 1-084-00-03

LAYER INFO FROZEN

HYDRAULIC HOSE DETAILS FOR HPH 2400

Control Side of Hammer (Sensor Side) - Assembly Number 2.110.00.01

Qty	Description (Hose Length = Cut Length)	Part No.
2 off	Hose Assy 965mm 3/8" R2T c/w 20 x 1.5 heavy 12s fem E/E	2.110.01.01
4 off	Hose Assy 990mm 3/8" R2T c/w 20 x 1.5 heavy 12s fem E/E	2.110.02.01
4 off	Hose Assy 750mm 3/8" R2T c/w 20 x 1.5 heavy 12s fem E/E	2.110.03.01
3 off	Hose Assy 920mm 3/8" R2T c/w 20 x 1.5 heavy 12s fem E/E	2.110.05.01
3 off	Hose Assy 1160mm 3/8" R2T c/w 20 x 1.5 heavy 12s fem E/E	2.110.06.01
30 off	GE12 PSR ED 12s x 3/8" BSP Stud	1.111.14.02
2 off	RHZ 12 PSR ED 12s x 3/8" BSP Stud (check valve)	1.100.03.02

Height Adjusting Ram Hoses

1 off	Hose Assy 560mm ¼" R2T c/w 16 x 1.5 heavy 8s fem to 8s 45° fem	2.110.08.02
1 off	Hose Assy 530mm ¼" R2T c/w 16 x 1.5 heavy 8s fem to 8s 45° fem	2.110.08.03
2 off	GE8 PSR ED 8s x ¼" BSP Stud	1.111.12.01
2 off	GE8 PSR ED 8s x 3/8" BSP Stud	1.110.02.02

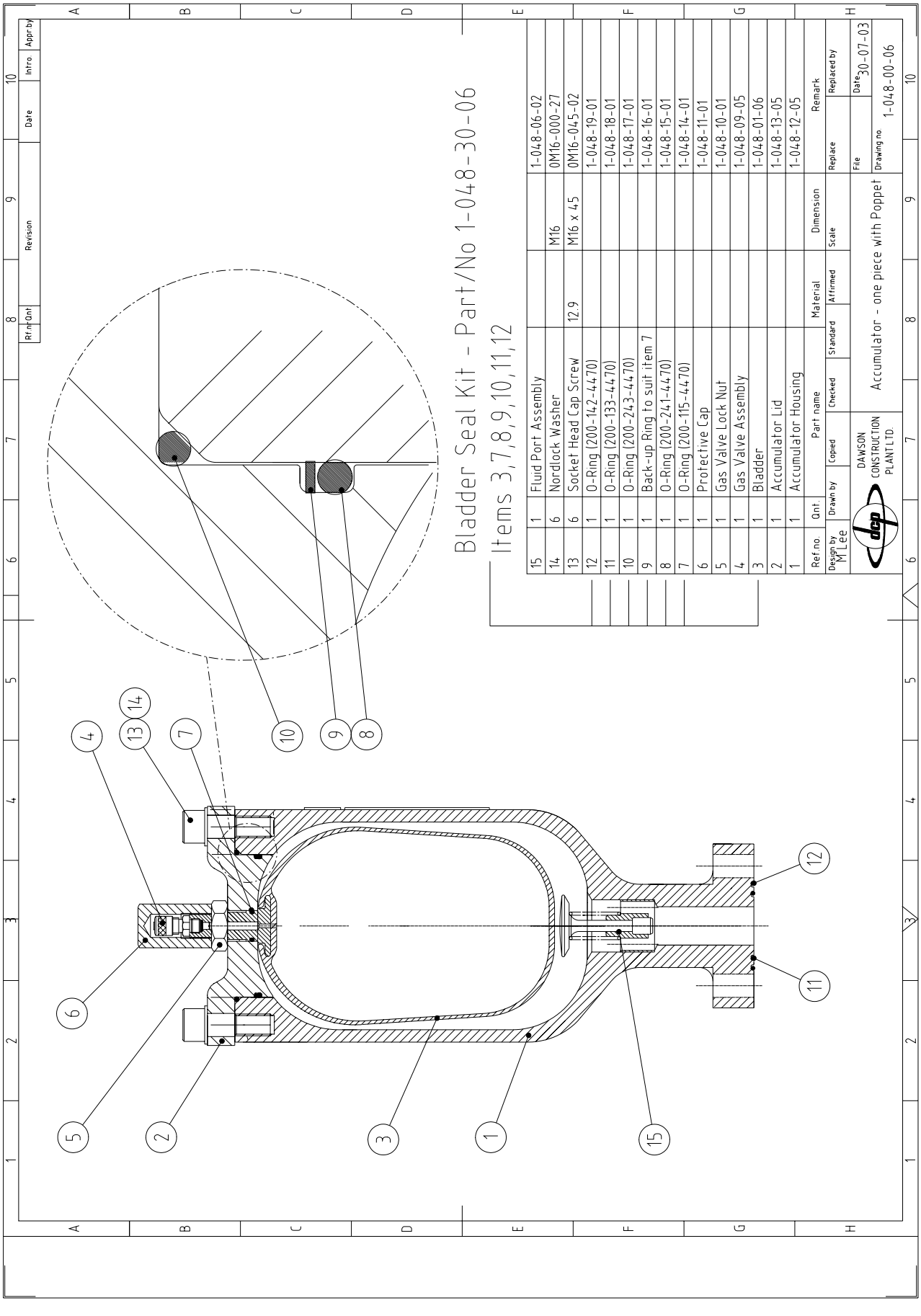
Power Side of Hammer (Supply Side) - Assy Number 2.111.00.05

1 off	Hose Assy 2480mm (Flange to Flange) 1½" R13 c/w 1½" SAE 6000 Straight Flange - Interlock type	2.111.01.01
1 off	Hose Guard c/w Cable Ties	2.111.04.01
1 off	Hose Assy 1500mm (Flange to Cone) 1" 4SH c/w 42 x 2 heavy 30s fem to 1" SAE 6000 Straight Flange - Interlock type	2.111.02.01
1 off	Voss Flanged Elbow 195241	1.111.17.01
4 off	1½" SAE 6000 Split Flange Clamps - metric bolt holes	1.088.00.01
2 off	1" SAE 6000 Split Flange Clamps - metric bolt holes	1.111.20.01
8 off	M16 x 55 Socket Head Cap Screws	4056
8 off	M16 Spring Washer	1.090.00.01
4 off	M12 x 45 Socket head Cap Screws	1.111.24.01
4 off	M12 Spring Washer	1.094.00.01

Fittings for underside of Inlet Manifold

2 off	3/8" BSP M/M Adaptor (restricted 0.79mm bore)	1.100.02.02
1 off	1¼" BSP M/M Adaptor	1.101.08.01
1 off	1½" BSP M/M Adaptor	2.111.03.01

Appendix 7.2 – Accumulator Parts List and Instructions


Bladder Seal Kit - Part/No 1-048-30-06
Items 3,7,8,9,10,11,12
Accumulator - one piece with Poppet
DAWSON CONSTRUCTION PLANT LTD
Design by M Lee
Drawn by
Copied
Checked
Standard
Affirmed
Scale
Replace
Replaced by
File
Date 30-07-03
Drawing no 1-048-00-06
Ref no. | Qnt. | Part name | Material | Dimension | Remark
15 | 1 | Fluid Port Assembly | | | 1-048-06-02
14 | 6 | Nordlock Washer | | M16 | 0M16-000-27
13 | 6 | Socket Head Cap Screw | 12.9 | M16 x 45 | 0M16-045-02
12 | 1 | O-Ring (200-142-4470) | | | 1-048-19-01
11 | 1 | O-Ring (200-133-4470) | | | 1-048-18-01
10 | 1 | O-Ring (200-243-4470) | | | 1-048-17-01
9 | 1 | Back-up Ring to suit item 7 | | | 1-048-16-01
8 | 1 | O-Ring (200-241-4470) | | | 1-048-15-01
7 | 1 | O-Ring (200-115-4470) | | | 1-048-14-01
6 | 1 | Protective Cap | | | 1-048-11-01
5 | 1 | Gas Valve Lock Nut | | | 1-048-10-01
4 | 1 | Gas Valve Assembly | | | 1-048-09-05
3 | 1 | Bladder | | | 1-048-01-06
2 | 1 | Accumulator Lid | | | 1-048-13-05
1 | 1 | Accumulator Housing | | | 1-048-12-05

Appendix 7.2 – Accumulator Parts List and Instructions

Important Safety Notes for Bladder Accumulators

1. Use nitrogen gas only
2. All accumulators are supplied precharged to 100bar (1450 psi) unless sent via air-freight – in which case they will be shipped unprecharged
3. Always use the gas filling apparatus supplied by Dawson. This equipment includes a regulator valve specifically designed for use with hammer accumulators where the precharge pressure is less than the supply cylinder pressure.
4. Read the instructions below fully before attempting to adjust the precharge in any accumulator
5. Routine maintenance on the accumulator in-situ or removal of the accumulator must only be carried out when the hydraulic system pressure has been completely removed.

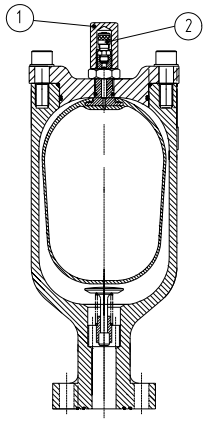
Accumulator Pre-charge Pressure

High pressure accumulator – 100 bar

Low Pressure Accumulator – 3 bar

Pre-charge Procedure

Figure 1



1. Remove Protective Cap (1) and Sealing cap (2) – see figure 1.
2. Attach the Regulator Valve to the nitrogen cylinder – see figure 2.
3. Attach the charging set (5) to the accumulator gas valve assembly (6) and connect charging hose (7) between the regulator and the charging set connection.
4. Back off handle (8) anticlockwise until loose. Check gas bleed valve (9) on charging set is closed and screw hand wheel (10) clockwise to open gas valve.
5. Open nitrogen cylinder valve by turning key (11), cylinder pressure will register on right hand gauge (12). This pressure should be checked against the required precharge pressure.
6. Turn handle (8) clockwise until outlet pressure on left hand gauge (13) registers 10% higher than required precharge pressure (110 bar or 3.5 bar). When pressure on the charging set and outlet gauges are equal, close nitrogen cylinder valve.
7. Turn hand wheel (10) anticlockwise to seal gas valve.
8. Crack bleed valve (9) to exhaust gas from charging hose and remove hose from charging set and replace hose connection sealing cap.
9. Close bleed valve, turn hand wheel (10) clockwise to open gas valve and crack bleed valve (9) to vent down to required precharge pressure. Close bleed valve.
10. Turn hand wheel (10) anticlockwise to reseal gas valve, crack bleed valve and remove charging set from the accumulator.
11. Test accumulator gas valve for leaks using soapy water or similar.
12. Replace sealing cap (2) and tighten with pliers. Replace protective cap using a wrench.

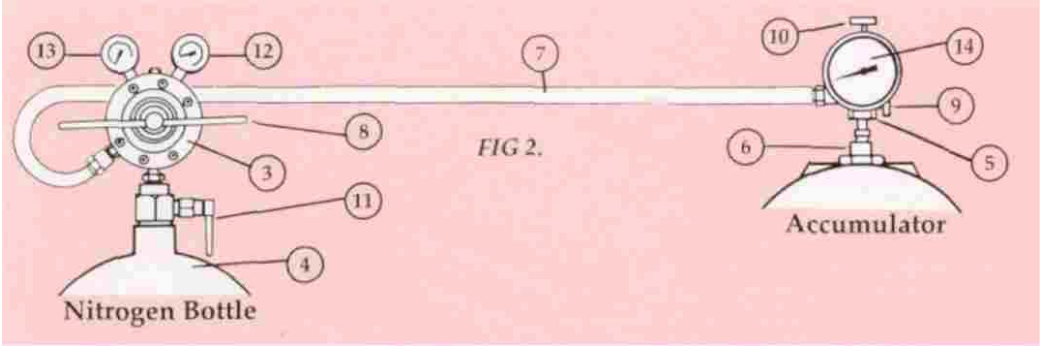


FIG 2.

Inspection and repair of Accumulators

Due to the nature of the design and specific assembly procedures it is recommended that the accumulators should only be inspected and repaired by a competent person. Dawson Construction Plant Limited or their approved dealers will be happy to undertake this work as required. Please note the Important Safety Notes at the beginning of this section.

Removal of Accumulator Pre-charge

- Remove Protective Cap (Item 6) from the Bladder Stem by unscrewing anti-clockwise
- Remove the Sealing Cap from the Gas Valve Assembly (Item 4)
- Connect Charging Set to the Gas Valve Assembly
- Release all the gas pressure by opening the Bleed Valve (Item 9 on the gas Charging Set)
- Disconnect the Charging Set from the Accumulator

Removal of Accumulator Lid & Bladder

- Remove M16 Socket Head Cap Screw (Item 13) and washers (Item 14)
- Remove Lid & Bladder (Item 2) from Accumulator Housing (Item 1)

Cleaning and Inspection

- Clean all metallic components with an organic solvent – do not use on rubber components
- Inspect the Bladder (Item 3) for any visible signs of damage. (Cracking or Surface Abrasion etc.)
- Inspect the Housing (Item 1) and Lid (Item 2) both inside and outside for signs of corrosion / mechanical damage.
- Replace any parts found or considered to be defective.
- Replace the following parts irrespective of condition:
    1) O-Rings – items 7, 8,10, 11 and 12
    2) Back -up Ring – item 9
- If the unit was removed from the system the connecting O-Rings (items 11 and 12) should be replaced irrespective of condition

Replacement of Bladder – having removed the Accumulator Lid

- Unscrew the Gas Valve Assembly (Item 4) from the Bladder Stem by turning anti-clockwise.
- Remove the Locknut (Item 5) from the Bladder Stem by turning the Locknut anti-clockwise, remove the bladder from the Accumulator Lid.

Fitting of Bladder to Lid

- Ensure 'O'-Ring (Item 8) is fitted to new the Bladder's stem. Push the stem through the central hole in the Lid (Item 2) then fit Locknut (Item 5)

Fitting of Bladder & Lid to Accumulator Body

- Checking that all O-Rings & Back-up Rings are in Place. Expel all nitrogen from the Bladder (Item 2) to enable it to pass through the top opening in the Housing (Item 1).
- Insert the assembled Bladder & Lid into the Accumulator Housing aligning the holes in the Lid with the M16 tapped holes in the Housing
- Ensure the M16 Socket Head Cap Screws (Items 13) are in good clean condition then install them together with the M16 Nordlock washers (Items 14) into the top of the Housing
- Tighten Items 13 to a torque of 231Nm (173 lbs.ft)
- Re-fit the Gas Valve Assembly (Item 4) and tighten
- Re-fit the Protective Cap (Item 6) and tighten

Re-Assembly is now complete and the accumulator is ready to be Pre-charged – see details at the top of this section.

PRIOR TO APPLYING HYDRAULIC PRESSURE TO THE SYSTEM THE ACCUMULATOR MUST BE PRECHARGED WITH NITROGEN IN ACCORDANCE WITH THE ABOVE INSTRUCTIONS. FAILURE TO DO SO WILL RESULT IN BLADDER FAILURE.

APPENDIX 7.4 -

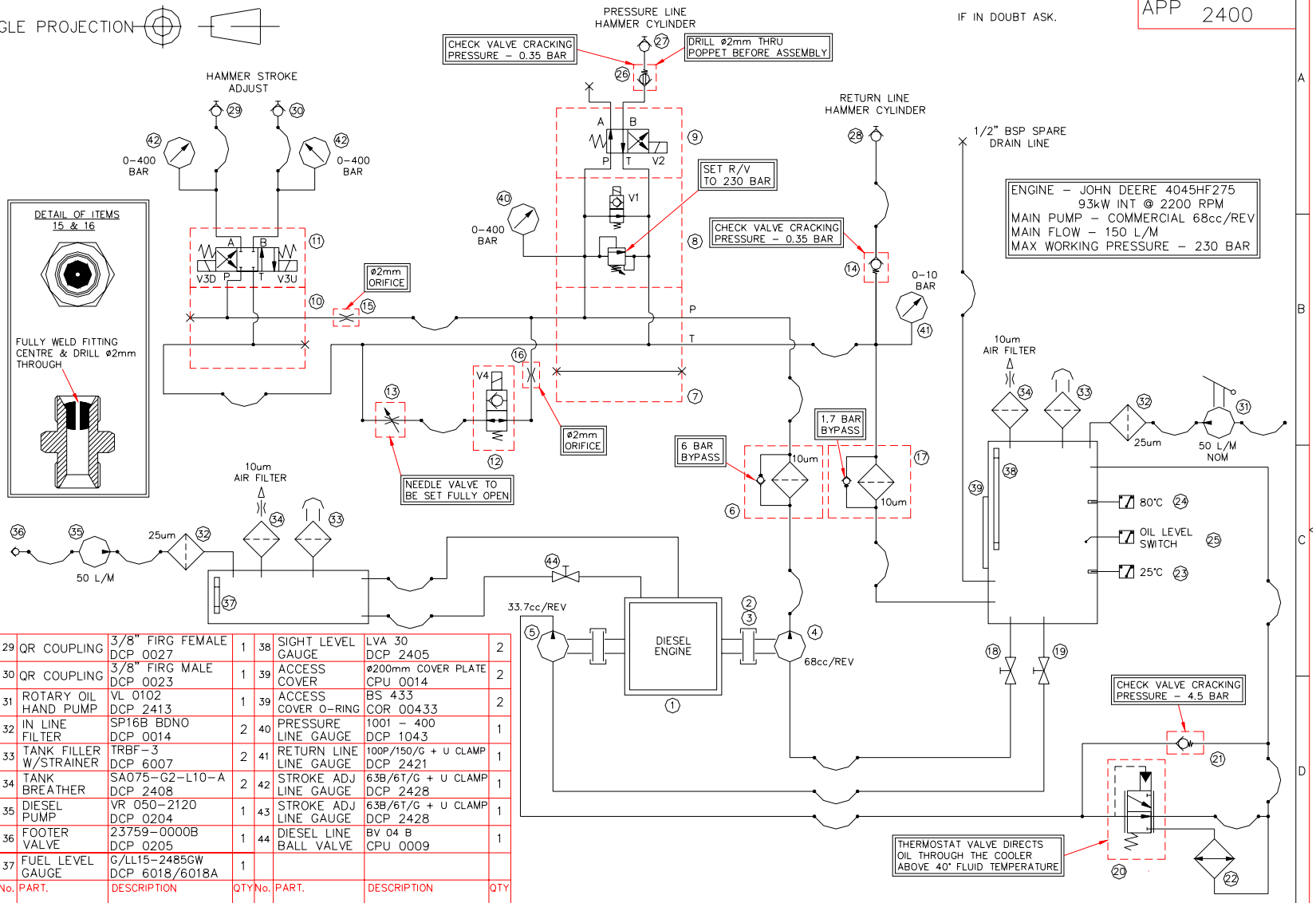
HPH 2400 POWER PACK

PARTS LISTS –

please refer to Power pack manual for full details

DRG. NO. HPH 2400 | SHEET NO. OF | 3rd ANGLE PROJECTION | IF IN DOUBT ASK. | APP 2400

No.	PART.	DESCRIPTION	QTY
1	DIESEL ENGINE	JOHN DEERE 4045HF275 DCP 2401	1
2	COUPLING	CF-K-125-4M3003	1
3	BELL HOUSING	08FLSAE3.101.6 DCPEUR 2010	1
4	FIXED DISPLACEMENT PUMP	P350A.497.EJ.AB17.7 DCP 2016	1
5	FIXED DISPLACEMENT COOLING PUMP	3ANS50 AS DCP 2433	1
6	PRESSURE FILTER	24P.2.10C.M.1 DCP 2011	1
7	MANIFOLD BLOCK	MR7.1.G.1" DCPEUR 2007	1
8	RELIEF UNLOADER	YRFI-LCN-B-T DCPEUR 2009	1
9	CONTROL VALVE	DPHI.2631.2.N.24V DC DCPEUR 2004	1
10	MANIFOLD BLOCK	MR3.1.G DCPEUR2008	1
11	CONTROL VALVE	DHI.0711.2.N.24V DC DCP 0010	1
12	WARM UP CARTRIDGE	OD-15-06-56 DCP 0033	1
12	WARM UP VALVE BODY	OC-10-09-004 DCP 0034	1
12	WARM UP VALVE COIL	OD-02-03-01-30-OC DCP 0035	1
13	FLOW CONTROL	NVO6B CPU 0025	1
14	RETURN LINE CHECK VALVE	CV12A-05 DCPEUR 2006	1
15	ADAPTOR RESTRICTOR	1/2"-3/8" BSP M/M (MOD) CFG 1212 (MOD)	1
16	ADAPTOR RESTRICTOR	3/8" BSP M/M (MOD) CFG 3803 (MOD)	1
17	RETURN FILTER	40.CN1.10C.M2-25.E2E2.1 DCP 0115	1
18	MAIN SUCTION CHECK VALVE	BV 24 B DCP 0012	1
19	COOLER SUCTION CHECK VALVE	BV 16 B DCP 2407	1
20	COOLER LINE THERMOSTAT	E7053-45 DCP 2402	1
21	COOLER LINE CHECK VALVE	CV8A-65 DCP 3509	1
22	ENG MOUNT HYD COOLER	SUPPLIED WITH JOHN DEERE ENGINE	1
23	25°C TEMP SWITCH	TS.IRNO.025.3/8 BSP DCP 1127	1
24	ADJUSTABLE THERMOSTAT	RS-561-460 SMM1 DCP 1050	1
25	FLOAT SWITCH	MFS 21E2 DCP 1128	1
26	"P" LINE CHECK VALVE	CV 10A-05 DCP 3510	1
27	QR COUPLING	1 1/4" A SERIES MALE DCP 2430	1
28	QR COUPLING	1 1/2" FIRG MALE DCP 2008	1
29	QR COUPLING	3/8" FIRG FEMALE DCP 0027	1
30	QR COUPLING	3/8" FIRG MALE DCP 0023	1
31	ROTARY OIL HAND PUMP	VL 0102 DCP 2413	1
32	IN LINE FILTER	SP16B BDNO DCP 0014	2
33	TANK FILLER W/STRAINER	TRBF-3 DCP 6007	2
34	TANK BREATHER	SA075-G2-L10-A DCP 2408	2
35	DIESEL PUMP	VR 050-2120 DCP 0204	1
36	FOOTER VALVE	23759-0000B DCP 0205	1
37	FUEL LEVEL GAUGE	G/LL15-2485GW DCP 6018/6018A	1
38	SIGHT LEVEL GAUGE	LVA 30 DCP 2405	2
39	ACCESS COVER	ø200mm COVER PLATE CPU 0014	2
39	ACCESS COVER O-RING	BS 433 COR 00433	2
40	PRESSURE LINE GAUGE	1001 - 400 DCP 1043	1
41	RETURN LINE GAUGE	100P/150/G + U CLAMP DCP 2421	1
42	STROKE ADJ LINE GAUGE	63B/6T/G + U CLAMP DCP 2428	1
43	STROKE ADJ LINE GAUGE	63B/6T/G + U CLAMP DCP 2428	1
44	DIESEL LINE BALL VALVE	BV 04 B CPU 0009	1


PRESSURE LINE HAMMER CYLINDER
CHECK VALVE CRACKING PRESSURE - 0.35 BAR
DRILL ø2mm THRU POPPET BEFORE ASSEMBLY
HAMMER STROKE ADJUST
RETURN LINE HAMMER CYLINDER
1/2" BSP SPARE DRAIN LINE
SET R/V TO 230 BAR
CHECK VALVE CRACKING PRESSURE - 0.35 BAR
0-400 BAR
0-10 BAR
ø2mm ORIFICE
DETAIL OF ITEMS 15 & 16
FULLY WELD FITTING CENTRE & DRILL ø2mm THROUGH
NEEDLE VALVE TO BE SET FULLY OPEN
10um AIR FILTER
25um
50 L/M
50 L/M NOM
6 BAR BYPASS
1.7 BAR BYPASS
10um
80°C
OIL LEVEL SWITCH
25°C
33.7cc/REV
DIESEL ENGINE
68cc/REV
CHECK VALVE CRACKING PRESSURE - 4.5 BAR
THERMOSTAT VALVE DIRECTS OIL THROUGH THE COOLER ABOVE 40° FLUID TEMPERATURE
ENGINE - JOHN DEERE 4045HF275
93kW INT @ 2200 RPM
MAIN PUMP - COMMERCIAL 68cc/REV
MAIN FLOW - 150 L/M
MAX WORKING PRESSURE - 230 BAR

DRAWN				
DG				
CHECKED				
	1	-	13/10/2003	-
	ISSUE	MOD. No.	DATE	CHK'D

TOLERANCES EXCEPT WHERE OTHERWISE STATED	
LINEAR	
UP TO 50	±0.25
OVER 50 TO 100	±0.50
OVER 100	±1.00
ANGULAR	+ 0.50°

REMOVE ALL BURRS, SHARP EDGES & CORNERS

0 ORIGINAL SCALE 50

DO NOT USE TO SCALE DRAWING.

MATERIAL: N/A

FINISH: N/A

SCALE: - 1: 1

TOLERANCES UNLESS OTHERWISE STATED

DIMENSIONS IN mm

EST. MASS

TITLE: HYDRAULIC & DIESEL SCHEMATIC

N.S.N.

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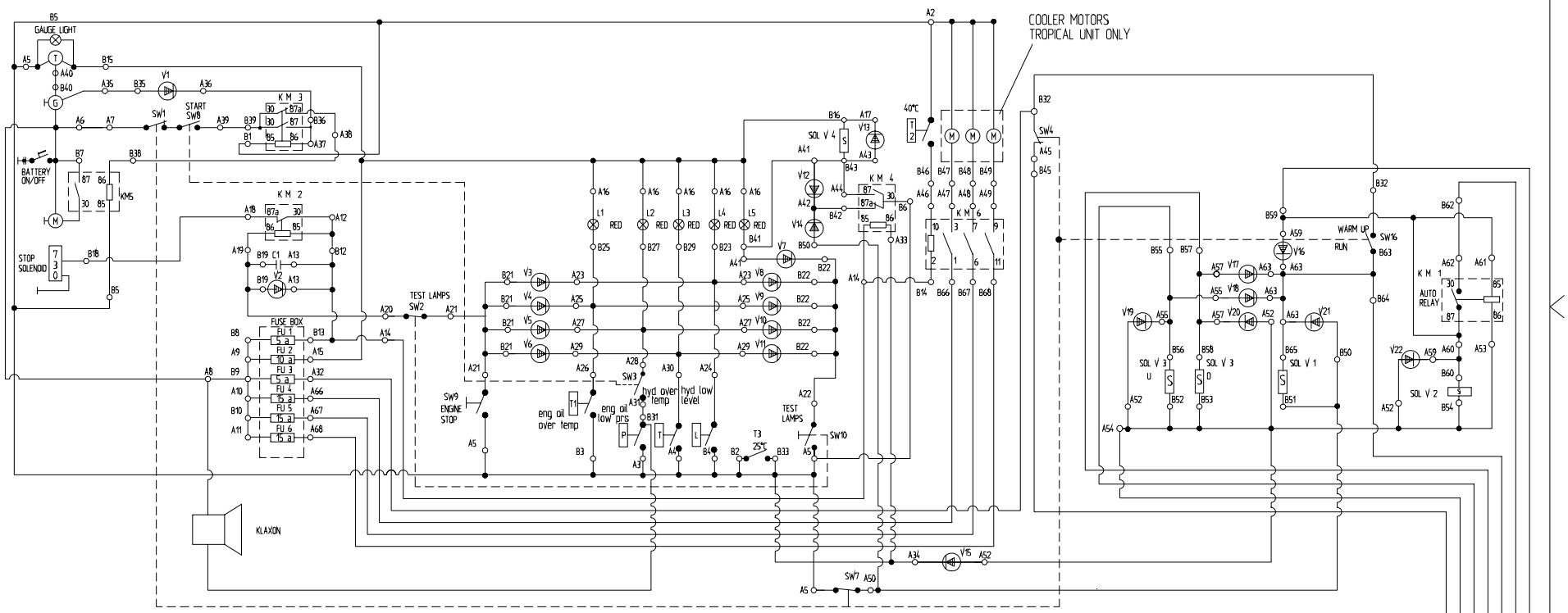
DRG. NO. HPH 2400 | SHEET NO. OF

Ref.nr	Qnt.	Revision	Date	Intro.	Appr.by

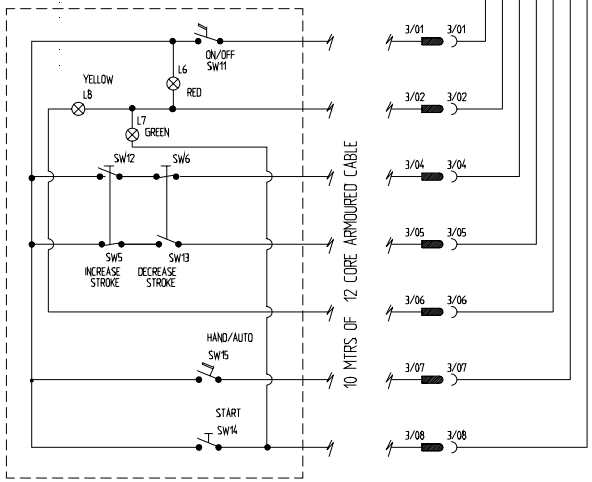


PENDANT

QTY	DESCRIPTION	PART No.	DESIGNATION
1	PENDANT BODY	XAC - A06	
1	L.E.D.	577 - 140	L6 RED
1	L.E.D.	577 - 156	L7 GREEN
1	L.E.D.	577 - 162	L8 YELLOW
2	SWITCH	ZA2 - BD2	
1	BUTTON	XAC - A9413	
2	BUTTON	XAC - A9412	
1	BLANK PLUG	ZB2 - SZ3	
2	CONTACT BLOCK	ZB2 - BE102	SW5 - 6
5	CONTACT BLOCK	ZB2 - BE101	SW11 - 15
10mt	12 CORE CABLE	369 - 163	
1	PLUG	486 - 741	
1	CABLE CLAMP	12 - 9610	

QTY	DESCRIPTION	PART No.	DESIGNATION
1	ENCLOSURE	28438	
1	PLATE	25721	
1	FUSE BOX	FBB 64-1	F1 -F6
4	RELAY	SRB 510	KM1 - 4
4	BASE	CYB 580	KM1 - 4
1	RELAY	SRB 601	KM5
1	RELAY	345-965	KM6
1	BASE	403-241	KM6
5	DIODE	261-823	V14 - V18
17	DIODE	261-299	V1 - V13, V19 - V22
1	CAPACITOR	107-606	C1
70	TERMINAL	952032	
3	BUTTON	ZB2 - BP2	
3	CONTACT BLOCK	ZB2 - BZ103	
1	SWITCH	XB2 - BD21	
5	CONTACT BLOCK	ZB2 - BE102	SW1- 4,SW7
4	CONTACT BLOCK	ZB2 - BE 101	SW8 - 10,SW16
1	BATTERY ISOLATOR	SSB - 106	
5	L.E.D.	590266	L1- 5 RED
1	TACHO	100238	T
2	THERMOSTAT	561 - 460	T1 - T2
1	THERMOSTAT	TS - IRNO - 025	T3
2	BATTERY	647	
1	LEVEL SWITCH	MFS 21E2	
1	SOCKET		

HAND HELD PENDANT



NOTE: SCHEMATIC REFERS UNIT No. 1368 ONWARDS.

Ref.no.	Qnt.	Part name	Manufacturer	Part number

Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
W.J.W	A3					NTS.		

DAWSON CONSTRUCTION PLANT LTD.

HPH 2400 ECO
HPH 2400 TROPICAL
ELECTRICAL SCHEMATIC L/OUT

File name | Date 22/10/97

Drawing no. 2teschet

APPENDIX 7.5 -

HYDRAULIC HAMMER TOOL KIT

(PART NO. 2.150.00.01)

PART NO.	QTY.	DESCRIPTION
065	1 off	3mm Allen Key
066	1 off	4mm Allen Key
067	1 off	5mm Allen Key
068	1 off	6mm Allen Key
2.150.01.01	1 off	8mm Allen Key
2.150.02.01	1 off	12mm Allen Key
2.150.03.01	1 off	14mm Allen Key
070	1 off	17mm Allen Key
1.150.02.01	1 off	19mm Allen Key - long series
1.150.03.01	1 off	22mm Allen Key
2.150.04.01	1 off	10mm Combination Spanner
1.150.12.01	1 off	19mm Combination Spanner
1.150.27.01	1 off	22mm Combination Spanner
1.150.28.01	1 off	24mm Combination Spanner
1.150.29.01	1 off	27mm Combination Spanner
1.150.09.01	1 off	18” Adjustable Spanner
1.150.21.01	1 off	External/Internal Circlip Pliers
1.150.20.01	1 off	5/16" Parallel Pin Punch
1.150.24.01	1 off	Soft Hammer
1.150.18.01	2 off	M24 Lifting Eye
1.150.16.01	1 off	¾” Sliding T Bar
1.150.23.01	1 off	¾” 200m Extension
2.150.06.01	1 off	65mm Socket 1” Square Drive
2.150.07.01	1 off	¾” Fem to 1” Male Convertor
2.150.05.01	1 off	2¼” A/F Open End Spanner
1.150.25.01	1 off	Grease Gun
1.070.00.01	1 off	Gas Filling Apparatus